WU 25
MAR 4 1921
copy 3

Vol. VII FEBRUARY, 1921 No. 2

The International Journal of Orthodontia and Oral Surgery

A Monthly Journal Devoted to the Advancement of the Sciences of Orthodontia, Oral Surgery, and Dental and Oral Radiography

Martin Dewey, D.D.S., M.D., New York
Editor-in-Chief

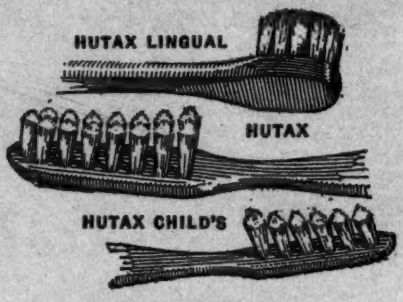
PROPERTY OF
DENTAL LIBRARY
UNIVERSITY OF MICHIGAN
DON'T MUTILATE OR
REMOVE

PUBLISHED BY
THE C. V. MOSBY COMPANY
SAINT LOUIS

$6.00 Per Annum Single Copies, 75 Cents

Copyright, 1921, by The C. V. Mosby Company

LISTERINE
TOOTH PASTE



Cuts Two-thirds Actual Size

¶ Composed of an unusually efficient neutral cleansing and polishing substance, flavored with the essential oils which impart to the antiseptic solution Listerine its agreeable odor and taste —slightly acidulated with a pleasant fruit acid which deters formation of "tartar" about the teeth and provides mild salivary stimulation.

Hutax Tooth Brushes

"Hutax" means Mouth Health

¶ We have been appointed United States distributors for these brushes, which were designed by a Committee of Dentists of the International Oral Prophylactic Association. All profit accruing to the Association from their sale is expended for research or education.

¶ The Hutax brush, used in conjunction with the Hutax Lingual brush—which is particularly suited to cleansing the inner surfaces of the incisors, regulating appliances and bridge work—provide the most approved means of tooth brushing. Particulars gladly furnished on request.

LAMBERT PHARMACAL COMPANY

SAINT LOUIS, U. S. A.

¶ *You should buy only one Dental X-Ray Outfit in a lifetime and before doing so*

SEE

EDWARDS Coolidge Dental X-Ray Unit
EDWARDS Mobile Tube Holder
(at your finger tips)
EDWARDS Gravity Time Switch
EDWARDS Auto Control
EDWARDS Angle Indicator
EDWARDS Cathode Protector
EDWARDS Face Conforming Funnel
(Constant film to target distance)
EDWARDS Automatic Filament Control

EDWARDS X-RAY CORPORATION

110 North New Jersey Street
INDIANAPOLIS, U. S. A.

SHERMAN'S
POLYVALENT
BACTERIAL VACCINES

SHERMAN'S VACCINE CONTAINER

Preparations with a Record for Efficiency

In the treatment of mouth infections, Bacterial Vaccines are now recognized as most efficient remedies.

Sherman's Bacterial Vaccines—20 formulas — marketed in standardized suspensions of 10 mil (c. c.) each. Price $2.00

LABORATORY OF
G. H. SHERMAN, M.D.,
DETROIT, MICH.

"Sherman's Vaccines are dependable antigens"

Williams
School of Orthodontia

The Next Annual Summer Session of the

Williams School of Orthodontia

will be held at Glenwood Hotel on Cayuga Lake, Ithaca, New York, commencing Monday, August 1, 1921. Prospectus on request.

Address:

O. T. RULE, D.D.S., Sec'y, 1 Bank St., STAMFORD, CONN.
OR
PERCY NORMAN WILLIAMS, D.D.S., 40 E. 41st St., NEW YORK CITY

International Journal of Orthodontia and Oral Surgery

A Monthly Journal Devoted to the Science of Orthodontia, Including Surgical Orthodontia, Oral Surgery, and Dental and Oral Radiography.

EDITORIAL STAFF—Orthodontia

MARTIN DEWEY, M.D., D.D.S., New York, *Editor-in-Chief.*
H. C. Pollock, D.D.S., St. Louis, *Associate Editor.*

Oral Surgery

M. N. Federspiel, D.D.S., M.D., Milwaukee.
Vilray P. Blair, M.D., F.A.C.S., St. Louis.
A. E. Smith, M.D., D.D.S., Chicago, Ill.
William Carr, M.D., D.D.S., New York.
R. Boyd Bogle, M.D., D.D.S., Nashville.
Jos. D. Eby, D.D.S., New York.
Thos. P. Hinman, D.D.S., Atlanta.
Thomas B. Hartzell, D.M.D., Minneapolis.
Arthur Zentler, D.D.S., New York City.
Leroy M. S. Miner, D.M.D., M.D., Boston.

Dental and Oral Radiography

James D. McCoy, D.D.S., Los Angeles, Calif.

Robert H. Ivy, M.D., D.D.S., Walter Reed Hospital, Washington, D. C.

B. Frank Gray, D.D.S., San Francisco, Calif.

C. O. Simpson, M.D., D.D.S., St. Louis, Mo.

All business communications should be addressed to the Publishers: C. V. Mosby Co., St. Louis.

(See page 112 for further information.)

CONTENTS FOR FEBRUARY, 1921

Original Articles

Primary Lines of Force of the Permanent Tooth. By Carl O. Engstrom, D.D.S., Sacramento, Cal. 59

Orthodontics, a Study in Six Dimensions. By G. G. Campion, L.D.S..... 70

Department of Oral Surgery and Surgical Orthodontia

Plastic Surgery of the Face. By Joseph C. Beck, M.D.. and Jacob Jesser, D.D.S., Chicago, Ill. 81

Department of Dental and Oral Radiography

Some Observations of the Radiodontist. By L. R. Main, D.D.S., St. Louis, Mo. 91

Abstract of Current Literature

Orthodontia, Oral Surgery, Surgical Orthodontia, and Dental Radiography..... 97

Editorials

A Practical Treatise on Artificial Crown, Bridge, and Porcelain-Work..... 112

Dental Hygienist 113

Orthodontic News and Notes

Orthodontic News and Notes..... 116

Mention this Journal when writing to Advertisers.

The International Journal of
Orthodontia and Oral Surgery
(*All rights strictly reserved*)

VOL. VII ST. LOUIS, FEBRUARY, 1921 NO. 2

ORIGINAL ARTICLES

PRIMARY LINES OF FORCE OF THE PERMANENT TOOTH*

BY CARL O. ENGSTROM, D.D.S., SACRAMENTO, CAL.

BY PRIMARY lines of force is meant the lines of first importance. They are considered as principal and fundamental lines peculiar to the individual tooth. In this presentation they must needs be elementary. The definition of force is that which changes or tends to change the relative condition as to rest or motion between two bodies. In this article two factors in the function of the teeth are dealt with, to-wit, force and tooth. To emphasize the identity of each and their equal importance, reference is made to a recent article wherein definitions of orthodontia are given; one as the "correction of malocclusion" and the other as "that which treats of forces controlling the form of the dental arch." One lays stress on position, the other on force. It is evident neither force nor form can be considered alone, but both are indispensable in the function of the teeth. In the mind of the writer, orthodontia is the science which treats of function in relation with the position of teeth. Instead of malocclusion, we refer to lost or disturbed function; and instead of correction, we refer to improved function. In improved function we have greater efficiency and in greatest efficiency, beautiful form and beautiful expression.

While the lines of force herein explained represent but a few of all in occlusion, they are of considerable importance in regard to the position of teeth. In the study of the position of teeth the lines of force are ascertained by the relative position of the teeth and their individual forms. Up to the present time this is a knowledge based mostly on experience and observation in treatment of cases. There is little data dealing with this subject, yet these lines of force are most potent factors in the maintenance of the tooth in proper equilibrium. The preservation of the health of the surrounding tissues depends to a very great extent on the proper delivery of force to it.

*Read at Annual Meeting of the Pacific Coast Society of Orthodontists, San Francisco, Feb. 16-17-18, 1920.

A knowledge of forms of parts is imperative to a proper understanding of this subject. The form of the tooth, crown and root, and the structure of the supporting tissues are such that force applied to the crown of a tooth in the natural and most effective manner shall be opposed by forces of supporting tissues, likewise of special design, conforming to such demands. The form of the root being unchangeable, there is only one position for it to occupy in proper function, reference being hereby made to Angle's "Line of Occlusion." Herein is a fundamental principle in the study of all dental operations. The human denture is composed of teeth designed for a varied usage, and accordingly the individual tooth presents many forms. In form and function no two teeth of an entire denture are exactly alike. Each tooth has an identity of its own. It must be borne in mind that the tooth is but a part of a great machine, a machine of itself, as dependent on other parts as the whole is on its parts. We will consider the tooth apart from its neighbors, and study it as a unit of itself. The single tooth is not to be thought of as an inert mass inserted in inert matter but a living part of a living body, a part used principally in the mastication of food, with lines and surfaces receiving and transmitting force in a variety of directions. Strictly speaking there is no such thing as a stationary tooth in the living being. Forces are continually at work causing movement of all parts of the body, and the tooth is no exception. The position of equilibrium of a tooth may be said to express the forces acting upon it.

Interest is to be confined to a study of directional forces, lines and surfaces of the permanent tooth in normal function, taking for description teeth not belonging to a particular type, but those described and illustrated in text books on dental anatomy. The purpose is to include such data that a more specific description of forces and a better understanding of the resolution of forces may be had, or in other words that more basic principles be formulated from which to make deductions.

In the study of lines and surfaces of the human teeth practically no straight lines are to be found. Therefore a strictly accurate description regarding their part in the promotion of force is beyond the intent of this article. But bear in mind force travels in a straight line (Newton's first law). Is it not a fact that in practice we consider inclines as without curvature? The specific direction of force will vary according to the variation in form of the tooth. A liberal interpretation will necessarily have to be made of that which is to follow and for ease and clarity straight geometric forms replacing the curvatures will be used. It will be necessary to introduce a few new terms to properly present the subject.

The position that this subject bears to general physics is quite obvious. However, that a clear understanding may be had, it may be best to start with the terms and definitions in physics applicable to our subject. Of the various subdivisions of general physics, our subject is included in mechanics, which treats of motions of bodies and the causes of changes in these motions.

Force is whatever changes or tends to change the motion of a body, or that which produces acceleration. The same thought is conveyed by the definition given in the first part of this article but given again for emphasis.

There are two kinds of motion, translation and rotation, the former when

every straight line in the body remains parallel to its original position and the latter when all points in the body travel in circles the centers of which lie in a straight line; this line is called the axis of rotation.

A point or body is said to have one degree of freedom when its motion is confined to a definite line; two degrees of freedom when confined to a definite surface, and three degrees of freedom when not restricted in any way. Note the structure of the tooth, its root and surrounding parts and it will be observed that the tooth has freedom in either of the three degrees. The conic root seated in the conic socket, or alveolus, allows for this.

A force is always accompanied by a counterforce or, we may say forces act in pairs.

When two equal and opposite forces act on a body they are in equilibrium.

It may be well to bear in mind Newton's three laws of motion as they will be used throughout our study.

First Law.—Every body persists in its state of rest or of uniform motion in a straight line unless it is compelled by some force to change that state.

Second Law.—The rate of change of the momentum of a body is in proportion to the force acting on the body and is in the direction of the force.

Third Law.—Action and reaction are equal and opposite.

Force is completely defined when its magnitude, its direction, and the point at which it is applied are given.

The resultant of two forces is defined as that single force which will produce the same effect upon a body as is produced by the joint action of the two forces.

The resultant of two similarly directed forces is equal to the sum of the two forces.

The resultant of two oppositely directed forces applied at the same point is equal to the difference between them, and its direction is that of the greater force.

The resultant of two equal and opposing forces is zero. Two equal and opposite forces not in the same line constitute a *couple.*

The equilibrant of a force or forces is that single force which will just prevent the motion which the given forces tend to produce. It is equal and opposite to the resultant.

The component of a force in a given direction is the effective value of the force in that direction. Whenever a force acts upon a body in some direction other than that in which the body is free to move, it is clear that the full effect of the force is spent in two directions, both of which forces are components of the single force. To ascertain the components of a force delivered to an inclined plane we may use the parallelogram method of resolution of force. (Fig. 1.) Let *AB* represent an inclined plane and *CD* force applied. The force applied is free to move in the direction of *B*. Hence *DE* represents the one component of *CD*. Using the force *DH* as the diagonal, a parallelogram *DEHG* is drawn—the side of the parallelogram *DG* represents the other component of *CD*, or the force spent at *D* in the direction *DG* first mentioned as the direction in which the force was not free to move.

Functional movement of the tooth in its alveolus is allowed by the peridental membrane. Be it understood that the tooth is in equilibrium and changes

of the supporting tissues and position of the tooth occur in consequence of the change of equilibrium of the forces acting upon the tooth. Mechanical force by an orthodontic appliance will change the position of equilibrium with result just mentioned. This constitutes in part orthodontic treatment.

Force transmitted by maxillary bones and by muscles in occlusion produces a stress represented in the teeth. Referring to the one jaw, force from the maxillary bone to the root of the tooth will be referred to as maxillary force and that in the opposite direction, crown toward root, occlusal force. These forces produce movement of the tooth in a maxillary direction and in an occlusal direction. These distinctions appear more applicable than up and down or elevation and depression. As force is always accompanied by counter-force, maxillary forces are the equivalents of occlusal forces or vice versa. The direct line of force between these two points using the central line of the upper central incisor tooth or center line of mass will be referred to as the *principal line of force.*

It may be noted that two like and opposite subsidiary lines of force produce the principal line of force. Coincident lines of force are the component lines of primary lines of force, which produce movement of the tooth in other than in

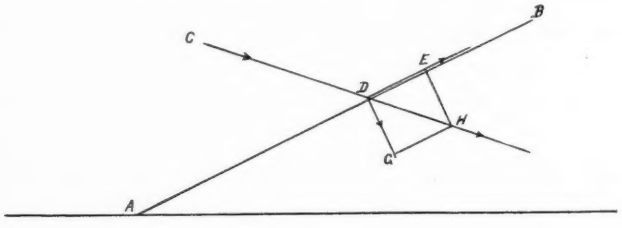


Fig. 1

line with the primary line of force. Hence we have primary lines of force and primary movement, coincident lines of force and coincident movement.

Particular emphasis may be placed on the principal line of force and much may be written in regard to it. It is the one line of force that is maintained in increasing degrees of usefulness throughout the various stages of life of the tooth. In this connection it is apparently as important that occlusal surfaces of teeth be maintained as nature provides with years of use, as that cusps with their inclined planes be not destroyed in young dentures. It may be observed that opposite subsidiary forces inclined toward each other, applied to the crown of the tooth are resolved in the direction of this line. By repetition it may be emphasized that all dental operations by restoration of part or all of the crown of the tooth involve a consideration of this line of force particularly. Also, full artificial dentures constructed with teeth of such a form and in such positions as to transmit force in conformity with the principle of this line of force, will possess greater efficiency than where this line is disregarded. And furthermore, the principal line of force in particular is an important factor in the study of the diseases of the investing membranes of the tooth. Aside from the principal line of force, all other lines of force may be called subsidiary, and are the lines which, acting singly and when coming in contact with the crown of the tooth, disturb the equilibrium of the principal line of force.

UPPER CENTRAL INCISOR

We will consider the upper central incisor from three aspects, mesial, labial, and occlusal or incisal. In order to present vividly the primary lines of force, a separate drawing is made of each view, also a drawing for each line of force. Bear in mind we do not consider magnitude but only direction of line of force. The occlusal and primary lines of force of the upper central incisor that are presented as directed vertically and horizontally are as follows:

Primary Lines of Force of the Mesial Aspect.

1. Principal line of force.
2. Vertical line of force to inclined plane.
3. Horizontal line of force.
4. Horizontal line of force to inclined plane.

Primary Lines of Force of the Labial Aspect.

5. Vertical line of force, mesial or distal, of principal line of force.
6. Vertical line of force to incline formed by junction of incisal and distal surfaces.

Primary Lines of Force of the Occlusal Aspect.

7. Horizontal line of force, mesial or distal of the principal line of force.
8. Horizontal line of force to incline mesial or distal of the principal line.

MESIAL ASPECT OF UPPER CENTRAL INCISOR

Referring to the mesial aspect, the upper central incisor is described as follows: "The root is conic in form, its base directed downward, its apex upward. The general form of the crown is that of a double inclined plane, or wedge-shape, the cutting edge representing the junction of the two sides of the incline, one of which looks anteriorly (labial) and the other posteriorly (lingual). The base of the wedge is directed upward and partakes of the contour of the neck of the tooth."

Using the outline as described of the upper central incisor as in Fig. 2 and superimposing two isosceles triangles, one for the root of the tooth *ABC* and one for the crown *ACD,* each having the same base at the neck of the tooth, the sides represent diagrammatically the general form of the tooth from mesial or distal aspect, and for our purpose this will be considered as representing a cross section of the tooth midway between the mesial and distal surfaces.

As the area of *ABCD* represents the body of the tooth and as heretofore mentioned transmits force from the occlusal to the maxillary or vice versa, it is necessary that parallel inclines *EF* and *GF* representing the cross section of the alveolus be drawn also. Be it remembered that maxillary forces are the equilibrants of occlusal forces.

(1) *Principal Line of Force.*—Using the aforementioned outline and drawing a line from the apex of one triangle to the other *BD* (Fig. 3) both triangles are bisected. This line, as has already been mentioned, represents the principal line of force and also the line of movement of the tooth vertically. Force in the direction of *HD* applied to the angle at *D* will cause a vertical

translation of the tooth in that direction, a primary movement vertical and maxillary. As in translation all lines of force move in parallel lines, we will draw two lines *MK* and *LJ* to represent lines of force directed to incline *EF* and *GF*. However, as the entire body of the tooth transmits force to these maxillary inclines, similar lines directed to any point along the inclines might be used. Force *MK* is resolved into two component forces, one in the direction of *F* and one in the direction of *K'*. The lines *JJ'* and *JF* represent the component forces of the line *LJ*. The maxillary equilibrants may be represented by *F'F*, for the line of force *HF* and for the resultant of the components *JF* and

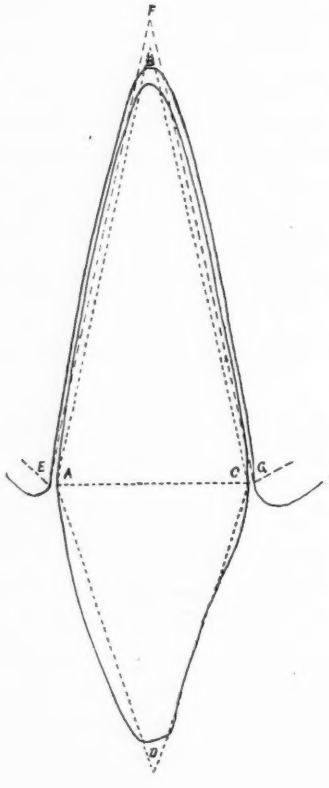


Fig. 2

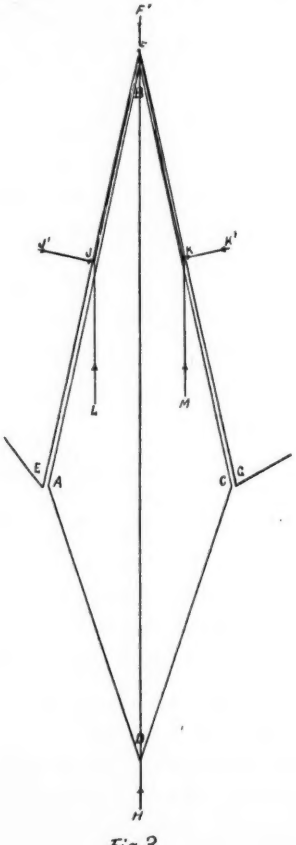


Fig. 3

KF. The maxillary equilibrants of the component lines of force striking the maxillary inclines may be represented by the lines *J'J* and *K'K*. The translation of the tooth is vertical and in a maxillary direction. Herein is primary movement and no coincident movement.

(2) *Vertical Line of Force to Inclined Plane.*—The primary line of force *HL* (Fig. 4) parallel to the principal line of force directed to the incline *DC* is resolved at *L* into components, one *LP* in the direction of *P* and one *LO* in the direction of *O*.

It is evident that force in the direction of *O* will produce rotation of the tooth with an axis represented by a center of attachment at *B*. Primary movement of the tooth is in the direction of the primary line of force *HL*, vertical and maxillary. The coincident movement is in line with *LO*. However, the com-

ponent *LO* may be projected to the incline *EF* as at *O* and here resolved into two components, one on the incline in the direction of *F* and one in the direction of *P*. Motion of the tooth occurs primarily in a maxillary direction and incidentally labially or lingually. The maxillary equilibrants are represented by the lines *F'F* and *PO*. If a primary line of force *M* be directed to the other incline *DA*, equidistant with force (*HL*) from the principal line of force, and supposing both inclines to be alike it will become resolved into components as above described. If it be made to act with the other force *H*, the components meeting at *O* effect a resultant represented by the principal line of force. In this

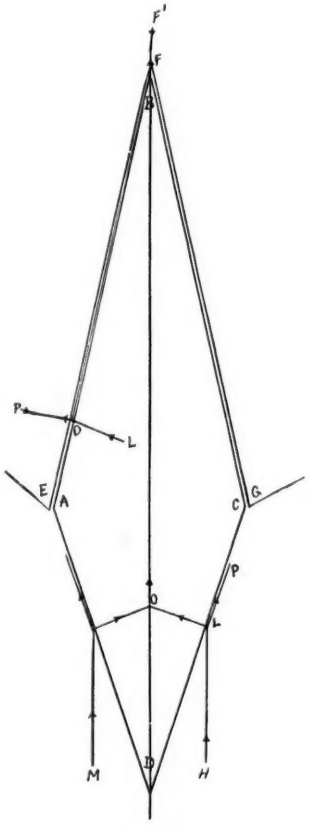


Fig. 4

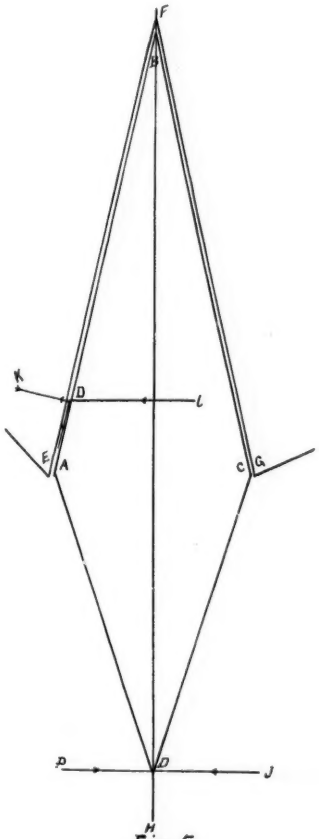


Fig. 5

latter case the primary movement of the tooth is vertical as in the description of the line of force preceding and no coincident movement is effected.

(3) *Horizontal Line of Force.*—A primary line of force *JD* (Fig. 5) directed at right angles to the principal line will cause rotation of the tooth with the axis at *B*. Hence primary movement is facial or lingual. The line of force *LD* projected to incline *EF* is resolved into components, one in the direction of *E*, and the other in the direction of *K*. The maxillary equilibrant is represented by the line *KD*. The consequent primary movement of the tooth is one of rotation with an axis as at *B* lingually or labially. The tooth is rotated with an occlusal translation effecting a coincident movement occlusally. It is obvious that a like force in the opposite direction to *JD* as *PD* will produce a resultant of zero or no movement.

(4) *Horizontal Line of Force to Incline.*—The primary line of force *HJ* (Fig. 6) directed at right angles to the principal line of force and to the incline *CD* is resolved into components, one in the direction of *D* as *JK* and one in the direction of *L*. This component force *JL* projected to incline *FE* is resolved into components *LM* and *LN*. The maxillary equilibrant of *LN* is represented by line *NL*. It will herein be noticed that motion of the tooth is produced primarily labially or lingually by rotation at *B* and coincidentally in a maxillary direction. A concomitant and similar force *OP* to the incline *AD* opposite to *HJ* will result in no primary movement of the tooth but in a coincident movement

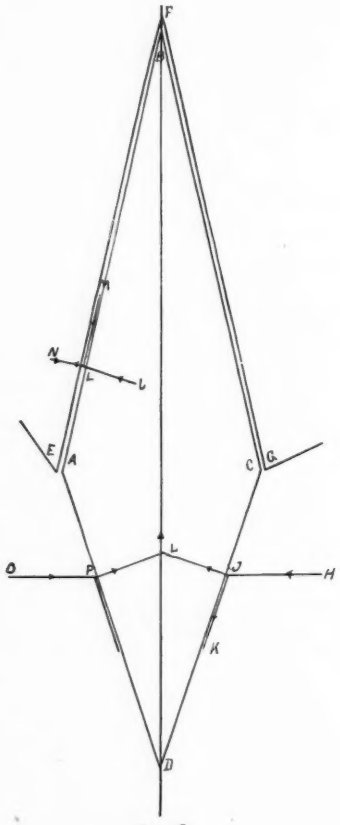


Fig. 6

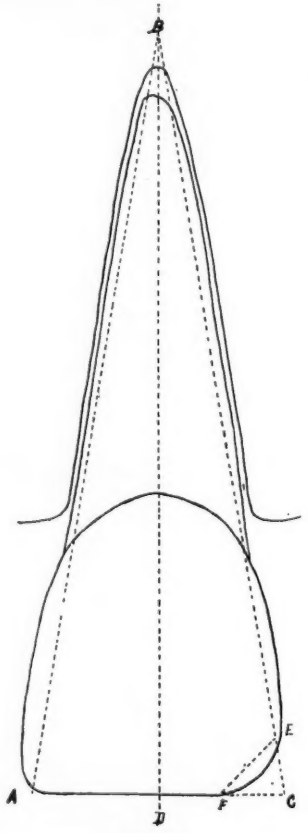


Fig 7

in a maxillary direction by effecting a resultant at *L* represented by the principal line of force *DB*.

LABIAL ASPECT OF THE UPPER CENTRAL INCISOR

The labial surface of the crown of the upper central incisor is described as resembling an imperfect quadrilateral. The root as before mentioned is conic in form, hence an isosceles triangle *ABC* may be superimposed over the outline of the central incisor as in Fig. 7. A line bisecting this triangle as *BD* is used to represent the principal line of force of the labial aspect. Maxillary inclines *EF* and *GF* are shown in Fig. 8. It will be noted the distal incisor angle is represented by a line *EF* which will be referred to later.

(5) *Vertical Line of Force Mesial or Distal of the Principal Line of Force.*—A primary line of force *HK* (Fig. 8) parallel to the principal line of force and striking the line *AC* representing the incisal edge of the tooth as at *K*, is directed to the maxillary incline *GF*. Slight rotation is effected by this line of force being to one side of the principal line *DB* causing a resolution of the line of force on the incline *FG*, into components, one in the direction represented by lines *KJ* and one in the direction of *F*. Resultant movement of the tooth is in the direction of *F* and the opposite incline *EF*. The resolution of the component force *KF* is shown on the incline *EF* as at *O*, one component in the direction of *P* and one in the direction of *F*. The equilibrants are represented by *JK*, *F'F* and *PO*. Primary movement due to this force *HK* is in a maxillary direction with coincident movement of rotation. A line of force repre-

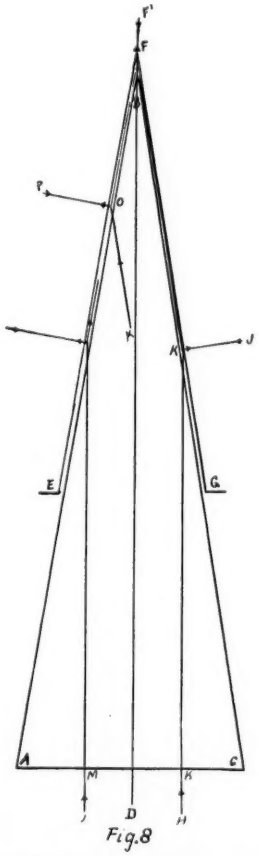


Fig. 8

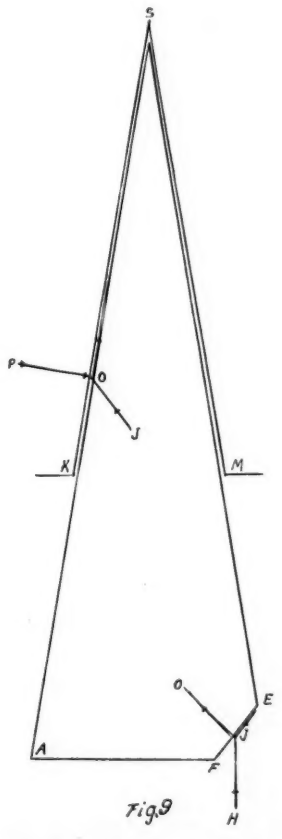


Fig. 9

sented by the line *IM*, directed to an equal distant point as that of *HK*, from the principal line and on the line *AC* is resolved into components similar to those of *HK*. The combined action of the two forces *HK* and *IM* is that of a primary vertical translation in a maxillary direction. In this case there is no coincident movement.

(6) *The Vertical Line of Force to Inclined Plane of Distal Incisal Angle.*—It is believed force delivered to incline *FE* (Fig. 9), in fact representing a rounded surface, so much more rounded as compared with mesial incisal angle, is of such significance as to be worthy of consideration. Such a form apparently is of value in the movement of eruption, in maintaining approximal con-

tact, and in conjunction with a like force of the other central incisor, it is of value in the equilibrium of the tooth. It may be observed that the effect of this line of force is similar in resolution to that described under the heading of primary line of force (No. 2). Line of force *HJ* is resolved into components, one in the direction of *E*, and one in the direction of *O*. The effect of the movement of the tooth in the direction of *O* on the inclined plane *KS* is a resolution of that force represented by the line *JO* into its components, one in the direction of *S* and one in the direction of *P* as the line *OP*. The primary effect of this force *HJ* is primary movement vertically and in a maxillary direction with coincident movement mesially.

THE OCCLUSAL ASPECT OF THE UPPER CENTRAL INCISOR

This view presents for our consideration a root whose outline is described as that of "a rounded triangle, one side of which faces a labial, one in a mesio-lingual and one in a disto-lingual direction. This triangular outline usually

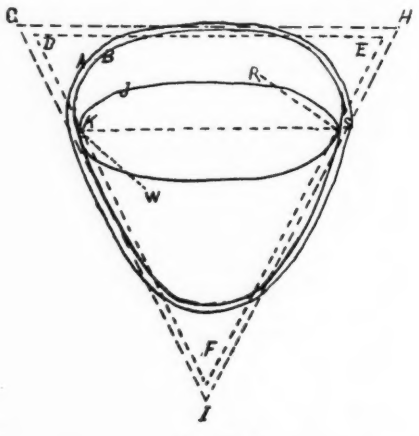


Fig. 10.

continues throughout the entire length of the root." Using the above description for the outline as in (Fig. 10) *B* represents the root; *A*, the alveolus; and *J* an outline of a cross section about midway between the incisal edge of the crown of the tooth and base of the root. We will superimpose a triangle *DEF* for the root and *GHI* for the alveolus. Line *KS* is drawn about midway between labial and lingual surfaces of the crown of the tooth. The line *RS* is used to represent an incline mesial or distal of the principal line.

(7) *Horizontal Line of Force Mesial or Distal of the Principal Line.*— The primary line of force represented by line *DV* in (Fig. 11) coming in contact with the line *KS* distally of the principal line which is represented by *N*, effects a rotation on the axis *N*. This force projected may be resolved into components as at *JL* and *M*. The force *D* projected to *J* on the incline *HI* is resolved into components, one in the direction of *I* and one in the direction of *O*. Resolution of lines of force are shown at *L* and *M*. From the above aspect primary movement is that of rotation with coincident movement as in this case lingually and to the opposite side mesially. This line of force should not be confounded with lines described as number *3* and *4*. Force *TU* parallel to

force *DS* but in opposite direction will form what is called a couple. The couple effects simply rotation. This primary line of force in conjunction with an opposite line *TV* effects no primary movement of rotation. Primary line of force *YK* equidistant with the line *DS* from *N* effects in unison primary movement of the crown of the tooth lingually in this case with no coincident movement.

(8) *Horizontal Line of Force to Incline Mesial or Distal of the Principal Line.*—In Fig. 12 the line *RS* is used to represent the incline as viewed from the occlusal aspect. The primary line of force *AB* is resolved into components, one in the direction of *S* and one in the direction of *O*. While the primary movement is one of rotation, the coincident movements of the crown of the tooth are mesial and lingual, or in a distal and lingual direction if it be mesial to the axis of rotation. This line of force, if projected to the incline *HI,* may be resolved into components as in the description of the line preceding. Line of force *LM* on the incline *WK* and in the opposite direction of *AB* forms a

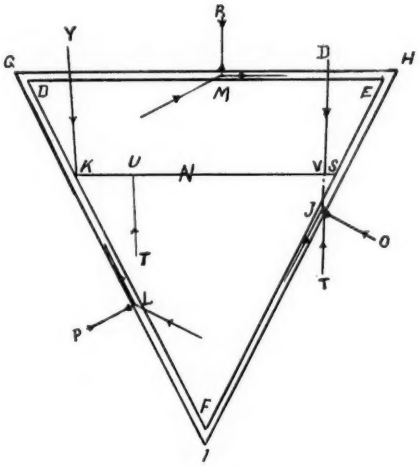


Fig. 11

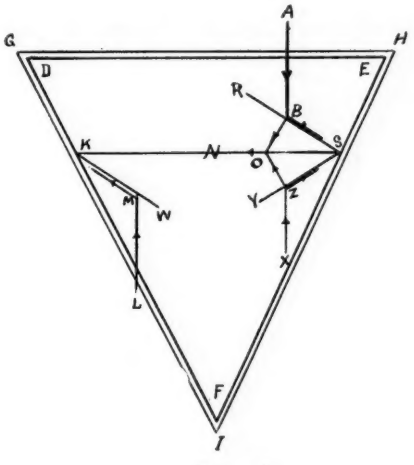


Fig. 12

couple with primary movement of rotation of the tooth. Line of force *XZ* opposite to the line *AB* effects coincident movement of the crown of the tooth in this case mesially.

In conclusion it may be said that it was deemed expedient to curtail description as much as possible in order not to be confusing and hence certain omissions have been made. The coaction of forces make a description and comprehension of each isolated force difficult, and combinations of different primary forces have for reasons set forth not been mentioned. However, an outline of primary lines of force, such as illustrated here in the case of the upper central incisor, furnishes fundamental principles on a more comprehensive scale than those heretofore described in the occlusal relations of the teeth. Functional improvement being our aim in practice, function is the basis for treatment. In the proper conception of function, lines of force such as these that have been mentioned, as well as those that are to follow, would have their proper relation neither exaggerated nor minimized among all other lines of force effective in the promotion of the position of teeth. The application of a

similar systematic arrangement of primary lines of force may be followed in the description of the other teeth of the dental apparatus with such changes as the individual tooth may warrant. This requires further elucidation of the subject.

BIBLIOGRAPHY

Broomell and Fischelis: Anatomy and Histology of the Mouth and Teeth, 1910, P. Blakiston's Son & Co.
Duff: A Textbook of Physics, 1918, P. Blakiston's Son & Co.

ORTHODONTICS, A STUDY IN SIX DIMENSIONS*

By G. G. Campion, L.D.S.

PROVISIONALLY and at the moment I define orthodontics as:

The study of the normal relations of the dental arches in themselves and in their relation to a normal facial configuration; the study also of the nature and causation of abnormalities and the means of correcting them so as to restore as far as possible normal relations to the arches and a normal configuration to the face.

Definitions such as this have at times their uses, but with the ever widening circle of our knowledge they become in time antiquated and are then relegated to that dim twilight land the land of the ineffective and the obsolete.

Each of the two parts of the masticating mechanism which we call the dental arches consists of sixteen minor elements, each of which may vary within wide limits from their normal relations to one another, and logically there can be no perception and recognition of the abnormal which is not based absolutely upon a preconceived knowledge of the normal. It is doubtless the general consciousness of this which is prompting the admirable studies which are now being made of the detailed relations of various elements in the normal arches of man. In pre-Darwin days, it was usual to speak of the normal as being grouped into different "types," but the infinite variations found in these types was at first the very basis on which Darwin slowly built up his great theory and afterwards was one of the constant features upon which that theory focused the attention of mankind. And these variations, so infinite in their number, so slight and so subtle in many of their differences necessitated and compelled a different method of regarding what we call the "normal." The old idea of normal "types," or at any rate many of the connotations attaching to this term, has largely passed away and what we call the normal is now regarded by modern biologists and anthropologists as what is called "an array of variates." The variations comprised in any array of variates which together we call the normal, shade gradually by minute differences into what we call the abnormal, and the line of demarcation between the two has never in reality anything about it like the clear-cut outline of a text book diagram. There is a graded transition between the normal and the abnormal through which the one passes almost imperceptibly into the other. If this be so it becomes obvious at once that a study of the variations in

*Inaugural Address, British Society for the Study of Orthodontics, January 14, 1920. Published by permission of "Dental Record," London, England.

and between the normal and abnormal must become a quanitative and not merely a qualitative study. Anthropology has passed through this change and has become largely anthropometry. The subject of our special study—Orthodontics—must pass through the same change and be investigated by similar quantitative modern methods. This change we can see already in progress and the first fruits of the method are now coming to hand. The foundations of the future science and art of Orthodontics are being laid and they are being laid surely and firmly in the intimate study by modern quantitative methods of the normal dental arches of man. This study is likely to be a long and laborious one, and it abounds in pitfalls, for as Sir James Paget said more than thirty years ago, "the higher we climb the hill of knowledge the steeper and more difficult does the ascent become." But if modern statistical methods seem to us intricate and difficult they also provide, for those who will take the trouble to handle them in the right way, necessary safeguards against hasty and imperfect generalisation.

I wish to speak today of Orthodontics as a study in six dimensions. The first three of these are the three dimensions of space as applied to each arch in itself and to the two arches acting together as the incisive and triturating part of the entire masticating mechanism. The fourth dimension is the relation of the normal or abnormal arches severally and jointly to the facial configuration. The fifth dimension is the relation of the various forms of abnormality to etiology and the sixth dimension is treatment.

If we take the first three dimensions together as the three dimensions of space so far as the two dental arches alone are concerned, we shall see at once that in these three dimensions are embraced all the minutiæ which have been so elaborately worked out in the relations of the several units of each arch to one another and the relations of the two arches to one another in the whole range of what we call normal and what we call abnormal occlusion. Altogether admirable work has been done by many workers in the past twenty years following the lead of Angle, in minute study of the relations of the many inclined planes of the cusps of the teeth and their importance under the masticating stresses in directing the teeth during eruption to right or to wrong positions in their respective arches, their importance also as interlocking factors in the maintenance of their normal positions and their importance too in the proper functioning of the two arches as triturating organs. But much yet still remains to be done to complete our knowledge of what we call the normal and to ascertain what are the factors which go to determine the different forms of arches which we see, and what are the relations if any between the sizes of the different teeth in an arch and the form which that arch comes to assume, and the relation of the sizes of the several teeth of an arch to the size of the arch as a whole. Here are problems still to be worked out in studies of the many normal variations which we meet in the examination of skulls with normal arches, and their gradual shading by minute differences both into one another on the one hand, and into the abnormal on the other—problems which will require years of consecrated research work and yet the knowledge of which when it has been acquired and when in addition we have learnt to apply it in practice may probably be very great.

At present we have no real knowledge of the various and variable quantita-

tive relations of the dental arches in themselves, nor have we at present any agreed method by which they should be investigated and determined.

Some years ago I worked out an index to show the relative length and breadth of the upper arch in a manner similar to that employed in other anthropometrical indices. For length I took the distance from the mesial extremity of the incisive margin of the central incisor to the centre of the distal margin of the masticating surface of the first molar on the same side. For breadth I took the measurement between the most prominent point on the buccal surfaces of the two first premolars. The breadth multiplied by 100 divided by the length

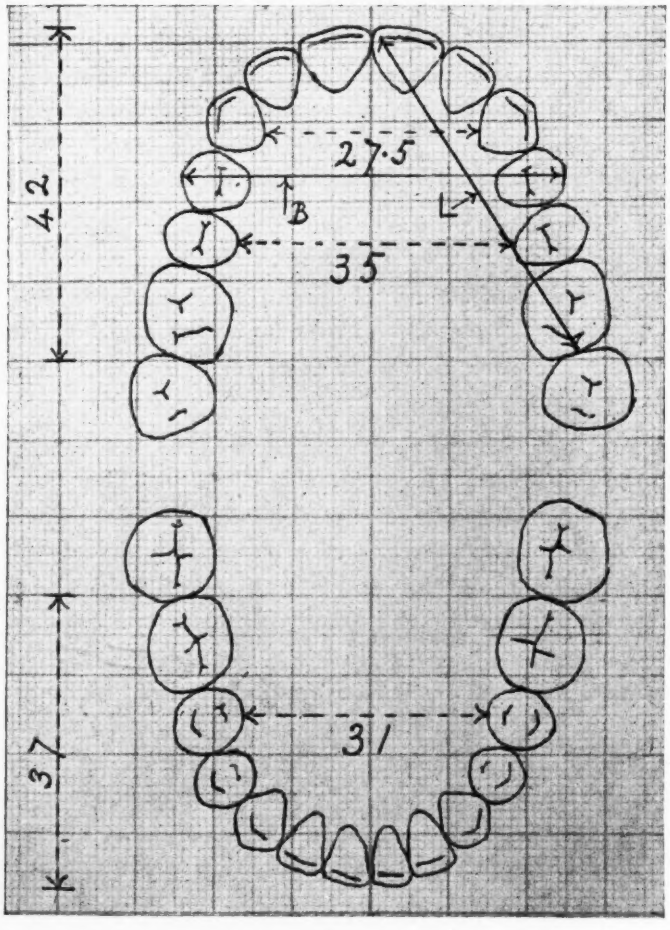


Fig. 1.—Normal arches, age seventeen years.

gave the breadth index of the arch. (Fig. 1.) Pont had previously made careful studies of the relative sizes of the teeth and their relations to the arch as a whole and Hawley constructed a geometrically normal arch to conform to similar data which he acquired. But anthropology does not smile upon attempts to compress its variants into geometrical formulæ like that which has been amusingly designated as "Bonwill's Law," and a geometrically constructed arch perhaps runs the risk of being more geometrical than normal, for it would seem to necessarily lack many of the variations, which we have seen the normal to include. Lately I have come to value highly Bogue's measurements across the

palate between the two second temporary molars and at a later age between the two second premolars. (Fig. 2.) But whatever arch measurements may ultimately be settled upon by a general consensus of opinion we know already most, if not all, of the variations from the normal which fall within these three dimensions; they include the mesio-distal variations from the normal included in Angle's Classes II and III, variations in the breadth of arches, open-bite, and variations from the normal in incisor overbite; variations in Spee's curve, and the various abnormalities of position and inclination of individual teeth and

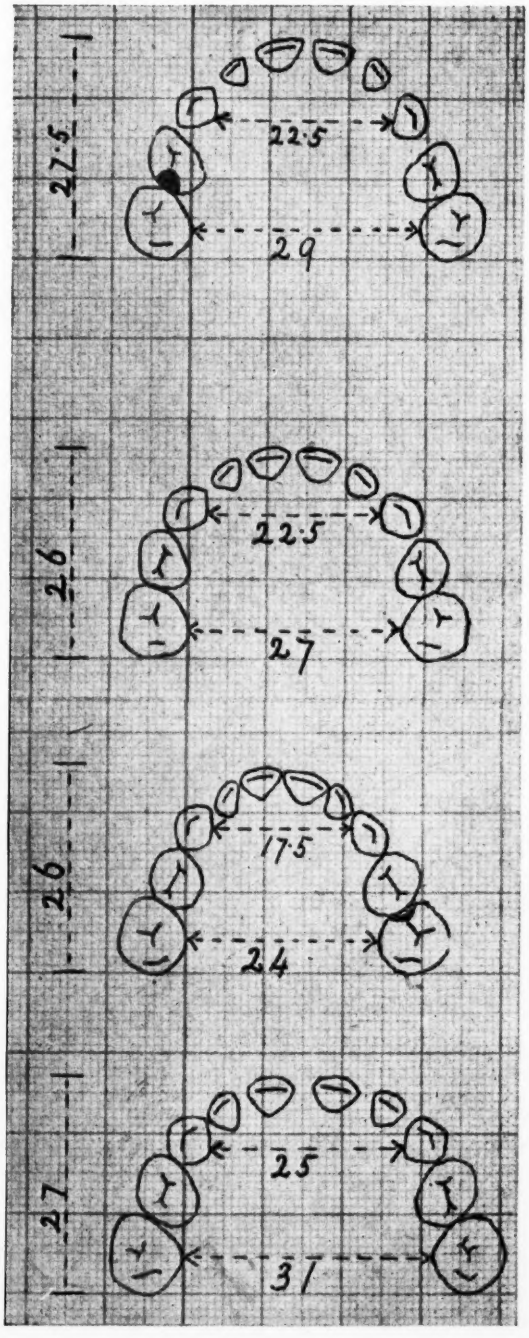


Fig. 2.—Superior arches of temporary teeth, showing variations.

groups of teeth which have been so variously labeled supraversion, infraversion, torsoversion, proclination, etc., etc. All these studies of the arches and all the abnormalities embraced under these and similar terms come within what I call the first three dimensions of our subject—three dimensions of space as applied to the dental arches considered as two units, and to the relations of the several elements of which these arches are each compounded.

FOURTH DIMENSION—FACIAL CONFIGURATION

I come now to what I call the fourth dimension of our subject—the relation of the normal or abnormal arches both severally and jointly to the facial configuration.

Of close study of the relation of normal and abnormal relations of the

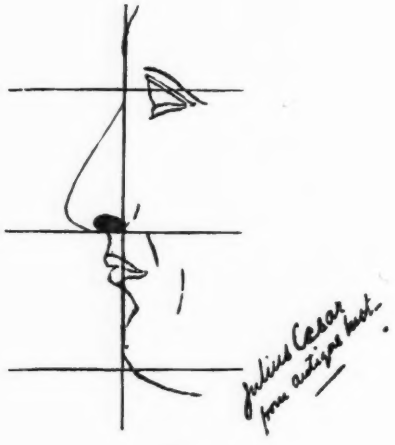


FIG. 3.

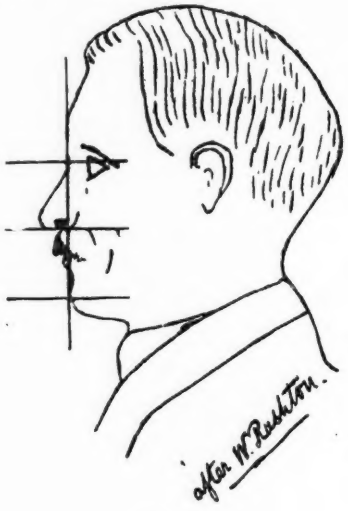


FIG. 4.

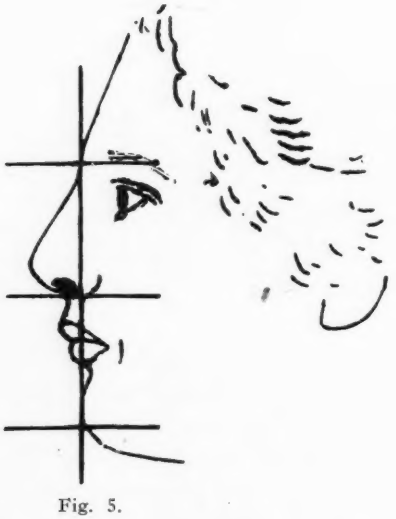


Fig. 5.

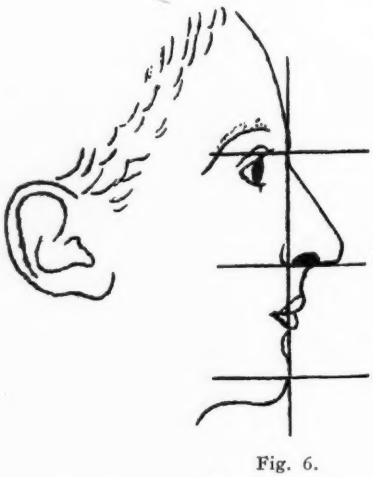


Fig. 6.

arches with facial configuration there has up to the present been very little and I agree wholly with a recent statement of Lischer's that when this work has been done the result will be to break down many of our preconceived ideas of the

whole subject. We talk of "harmony" and "disharmony" in the relations of the dental arches to the facial configuration, but these words used in this connection seem to partake very much of the nature of what anthropologists in their studies and descriptions of primitive man term "holophrases"; and a "holophrase" is merely the verbal form or sound with which civilized no less than primitive man endeavors on the one hand to give expression to his inchoate and quite imperfect knowledge, and on the other hand to camouflage as far as possible his very real ignorance. An amusing example of a "holophrase" was once given me by a medical man who had spent some time in one of the Pacific islands. It was an island to which western civilization had only recently penetrated, an island where the memory of some of the older inhabitants went back easily to the good old days of cannibalism, and when before the advent of western ideas and habits the animals which we call cattle were unknown. When cattle were imported, the islanders were, of course, much impressed by the arrival and dignity of these strange beasts. They heard the individual animals called now by the

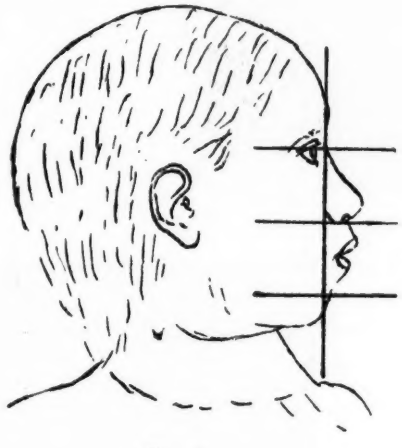


Fig. 7.

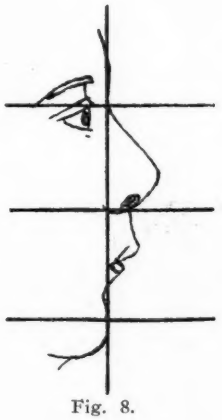


Fig. 8.

name of bull, now by the name of cow, and being at first inappreciative of the difference between them they invented a holophrase to embrace them all and they became known individually and collectively both then and afterwards as "bull-a-ma- cow."

The word harmony when applied to the relation of the dental arches to the facial configuration seems to partake in some degrees of this nature of a holophrase; it seeks to express something of which our knowledge is quite imperfect and to camouflage with as much dignity as possible our real ignorance of the nature and relations of the several elements or factors which go to make up the whole. The task lies ahead of us to analyze it, and find out something more of its nature and proportions. Mankind suffers many of its lapses and retrogressions in the slow upward struggle after what we call "progress" by continually allowing itself to be side-tracked from the paths pointed out by its greatest minds, and we may doubtless learn much from methods akin to those which are employed by artists in their studies of the human face.

I have found much help in studying the correlated abnormalities of the arches and face by a line drawn from the nasion or bridge of the nose to the

most prominent point of the chin. In what seemed to me the best of the normal and subnormal profiles this line nearly touches the posterior border of the nostril. The upper lip projects in front of this line about one-quarter or one-third of the amount of the projection of the nose. The lower lip projects somewhat less. If a horizontal line be drawn at right angles to the vertical one

Fig. 9.—Subnormal. Age ten.

Fig. 10.—Adenoids removed one year previously. Shows also condyle path and angle of mandible.

Fig. 11.—Full face of Fig. 10.

at the nasion, a second horizontal one at the lower border of the nose, and a third the same distance below the second as the second is below the first, the chin is always below this third line.

Figs. 3, 4, 5, 6 show sketches of normal and Figs. 7 and 8 abnormal faces. Figs. 9, 10, 11, 12 and 13 photographs of subnormal and abnormal faces.

The difficulty of any study of this kind is that there are really no fixed

points which can be readily used and applied to both young and adult faces. To find such points or a reasonably stable basal line is a desideratum which awaits research and determination.

FIFTH DIMENSION—ETIOLOGY

The causes of dento-facial abnormalities have been assigned to two groups, extrinsic and intrinsic, and of the former we know perhaps a good deal, of the latter we know little. In a brief and rapid survey of our subject as a whole, it is difficult and perhaps unnecessary to summarize our knowledge of today. It may be helpful to try and search for a way by which it may be made more complete in the future and since these abnormalities are essentially the manifestations of abnormal development, it would seem that the careful study of development, both of normal and abnormal cases, may be one of the paths leading to a fuller knowledge of etiology. The development of the dental arches in themselves

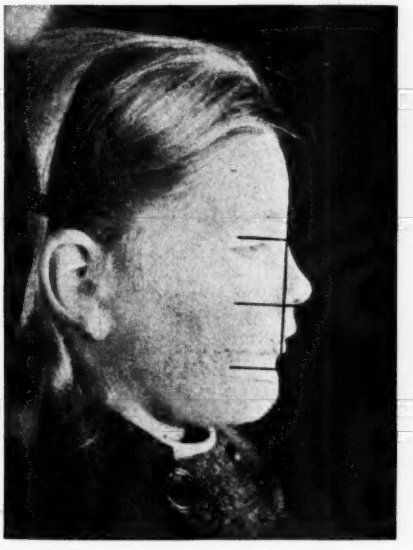


Fig. 12.—Angle's Class II, Div. 1. No adenoids or nasal stenosis.

Fig. 13.—Angle's Class II, Div. 1. Adenoids.

and in their relations to the face seems to be both sporadic and spasmodic. It goes on at one place, it seems to be arrested at another, it is in active progress at one period, it is quiescent at another. It is contingent, doubtless, for these variations on conditions of general health and environment and its variations must be studied in close relation to them.

Sir Frank Colyer gave us at our last meeting a most valuable contribution in the form of the progressive development of the dental arches of three individual children, through all the stages of childhood. Studies of this same kind in other children will, no doubt, show wide differences both in form and in time, and these variations when correlated with conditions of general health and surroundings may point to conclusions which we at present lack; but this search must also be extended to the relations of the dental arches themselves to the facial configuration, and I wish to bring before you a few results from some measurements taken recently on this point.

Justice seems not yet to have been done to that admirable instrument with the less admirable name invented by Dr. Sim Wallace and improved by Mr. Northcroft. I mean the prosopometer. It enables us to get sagittal measurements of the anteroposterior development of the face from the line of the external auditory meatus without the distorting error of diagonal measurement, and the results seem promising for further investigations.

From a number of measurements of faces of all kinds and ages I have selected a few from three groups, aged respectively nine to eleven, fifteen to sixteen and adult. Those cases selected were all with normal or subnormal arches and facies and in this respect are suitable for comparison.

The measurements taken were as follows:

A. From the nasion to the lower border of the nose.

B. From the nasion to the incisive margin of the upper central incisors.

C. From the nasion to the masticating surface of the upper first molars.

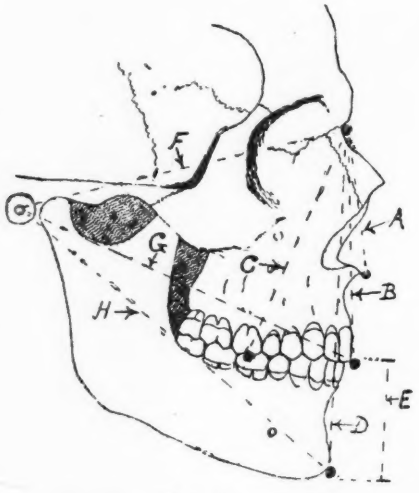


Fig. 14.

D. From the nasion to the lower margin of the mental prominence of the mandible.

E. From the incisive margin of the lower central incisors to the lower margin of the mental prominence of the mandible.

F. From the line joining the two external auditory meatuses to the nasion.

G. From the same line to the incisive margin of the upper central incisors.

H. From the same line to the tip of the mental prominence of the mandible.

The lines of measurement are indicated on the accompanying diagram, Fig. 14.

The last three measurements are sagittal measurements which are easily made with the prosopometer.

The callipers used for the first five measurements of the series were fitted with a curved plate the arc of a circle of about an inch diameter, which enabled it to be securely seated and held on the nasion while the measurements were made.

The measurement to the masticating surface of the molars was taken by means of a steel rod spanning the molars, the thickness of which was afterward deducted.

Table I gives the measurements in millimeters of the three groups of cases with the means, standard deviations and mean increases, etc.

Table II gives for more ready comparison only the means, standard deviations and mean increases.

TABLE I

LINE ON DIAGRAM.	AGE IN YEARS.	NO. OF CASES	MEAN.	S.D.	MAX.	MIN.	MEAN INC.
Nasion to lower border of nose A.	9 to 11	10	42.9	±2.55	47	38	
	15 to 16	9	49.3	±2.26	52	45	
	Adult.	10	53.2	±3.75	60	49	10.3
Nasion to edge of upper incisors. B.	9 to 11	10	64.0	±2.19	69	61	
	15 to 16	9	72.6	±4.11	78	65	
	Adult.	10	76.7	±4.56	86	72	12.7
Nasion to upper molars. C.	9 to 11	10	67.1	±2.53	72	63	
	15 to 16	9	74.0	±4.3	80	66	
	Adult.	10	80.6	±4.04	87	74	13.7
Nasion to chin D.	9 to 11	10	100.1	±2.60	103	95	
	15 to 16	9	111.4	±5.49	119	102	
	Adult.	10	122.8	±7.67	136	114	22.7
Lower Incisors to chin. E.	9 to 11	10	35.8	±1.17	38	34	
	15 to 16	9	40.8	±1.83	43	38	
	Adult.	10	44.7	±3.34	51	42	8.9
Auricular meatus to nasion. F.	9 to 11	10	89.9	±4.1	99	85	
	15 to 16	9	95.6	±3.16	99	89	
	Adult.	10	100.4	±3.87	105	92	10.5
Auricular meatus to U. Incr. Edge. G.	9 to 11	10	86.6	±2.97	91	82	
	15 to 16	9	94.0	±4.29	102	89	
	Adult.	10	100.6	±6.36	113	90	14.0
Auricular meatus to chin. H.	9 to 11	10	98.6	±3.67	105	92	
	15 to 16	9	104.3	±4.9	109	96	
	Adult	10	119.9	±8.65	138	103	21.3

TABLE II

MEANS AND STANDARD DEVIATIONS

LINE ON DIAGRAM	9 TO 11 YEARS.	15 TO 16 YEARS.	ADULT	MEAN INCREASE
A.	42.9 ± 2.55	49.3 ± 2.26	53.2 ± 3.75	10.3
B.	64.0 ± 2.19	72.6 ± 4.11	76.7 ± 4.56	12.7
C.	67.1 ± 2.53	74.0 ± 4.3	80.6 ± 4.04	13.7
D.	100.1 ± 2.60	111.4 ± 5.49	122.8 ± 7.67	22.7
E.	35.8 ± 1.17	40.8 ± 1.83	44.7 ± 3.34	8.9
F.	89.9 ± 4.1	95.6 ± 3.16	100.4 ± 3.87	10.5
G.	86.6 ± 2.97	94.0 ± 4.29	100.6 ± 6.36	14.0
H.	98.6 ± 3.67	104.3 ± 4.9	119.9 ± 8.65	21.3

These groups of measurements, while of course quite insufficient for establishing any criterion of the normal, yet seem suggestive enough to justify a large series being obtained from which the standard deviation might be calculated in normal and subnormal cases, and provide a criterion which might prove of use in approaching the etiology of the subject from the standpoint of development.

The many and multiform variations of and from the normal and also the causes of these variations are all comprised in what I have ventured to call those five dimensions of our study, and it would seem that any scientific classification of dento-facial abnormalities must also embrace these same dimensions. The final and definitive classification will not be possible until each of these dimensions shall have been more intensively studied and until our knowledge of all of them is more

complete than it is at present. But the advance which has been made in the last thirty years gives good augury for the future. Time was within the brief space of memory of many of us who are here to-night, when we were content to classify what we call dental irregularities into groups on which we dabbed such labels as V-shaped arches, saddle-shaped arches, anterior protrusion, protruding canines, etc.; these represent only a primitive stage in the history of the subject, and we have left them far behind. Angle's classification has since come and may in due time be also expected to go: it, too, represents an old tendency in medical history, the tendency to appear exact by disregarding the complexity of the factors and variations involved. One of America's representative men, Ralph Waldo Emerson, told us that "if a man fasten his attention on a single aspect of the truth and apply himself to that alone for a long time, the truth becomes distorted and not itself, but falsehood." What we call the scientific side of man's mind is not a whit less prone than what we call its religious side to build up idols of its meagre finger-breadths of knowledge and to call those idols the truth. Angle's classification has long seemed to me such an idol, its very simplicity and definiteness are perhaps no very inexact measure of its inadequacy, for by concentrating our attention primarily and most insistently on the relations of the two arches to one another in one dimension of space and ignoring the other four cognate dimensions to which I have referred it presents in its way a striking illustration of Emerson's dictum, and despite the very real practical convenience with which it enables us to indicate with a numerical label certain broad categories of abnormalities *in occlusion*, after studying these in their wider maxillofacial relations, one comes gradually in time to regard it with the uncomfortable sort of feeling that a structure which is balanced on one leg when it really needs five is not a structure which has about it much assurance of permanence.

Of later classifications there are those of Norman Bennett and G. Villain, of these the latter is entirely etiologic. The former, Bennett's, is wider in scope and is suggestive of the truth in two ways; first in reflecting adequately the complexity of the whole subject itself, and secondly by bringing us up repeatedly against those unknown factors which go to determine the normal or abnormal development of the associated osseous structures. Recent researches on the results of dietetic modifications of foods like those of which Mrs. Mellanby gave us in November so brilliant a demonstration may well prove of great significance, and such dietetic factors acting through or interacting with the functioning of the ductless glands may give the clue to a knowledge of the etiology of our subjects for which up to the present we have sought in vain.

I have now outlined five of the six dimensions into which I conceive the subject matter of our study to extend: of the sixth dimension or treatment, it is unnecessary to say anything here and now. It presses itself insistently on our attention and recalls us again and again to its further study by the incessant mingling of success and failure. It is well able to maintain for itself its rightful place in the whole story of the subject; a story which is being slowly unfolded by this and other kindred societies and workers, and a story the end of which is not yet in sight.

DEPARTMENT OF
ORAL SURGERY AND SURGICAL ORTHODONTIA

Under Editorial Supervision of

M. N. Federspi , D.D.S., M.D., F.A.C.S., Milwaukee.—Vilray P. Blair, M.D., F.A.C.S., St. Louis, Mo.— Arthur E. Smith, M.D., D.D.S., Chicago.— William Carr, A.M., M.D., D.D.S., New York.—R. Boyd Bogle, M.D., D.D.S., Nashville. —Major Joseph D. Eby, D.D.S., Atlanta.—Thos. P. Hinman, D.D.S., Atlanta.— Arthur Zentler, D.D.S., New York.—Leroy M. S. Miner, M.D., D.M.D., Boston.

PLASTIC SURGERY OF THE FACE*

By Joseph C. Beck, M.D., and Jacob Jesser, D.D.S., Chicago, Illinois

THE subject I am to present to you was selected by your secretary, and I thought that in order to make it as interesting as possible I would present some cases, photographs and casts rather than lantern slides, dealing with plastic surgery. I have nothing to present to you in the way of war surgery, and I make this statement at the outset so that the gentlemen who are to discuss my remarks may know that these are not war cases.

We have learned much in regard to war surgery from the English surgeons, particularly Gillies, which we can now apply in civil practice. One of the two things I have learned from him is the use of osteoperiosteal grafts for the reconstruction of bony structures of the upper and lower jaw and nose; and the other is the use of long migrating tube flaps. I might simply illustrate this by saying that a big flap may be taken from the side of the chest and formed into a tube, sewed up upon itself with the epidermis externally and allowing it to become firm and self-sustaining. This is quite an advance in plastic surgery. These osteoperiosteal grafts, usually from the tibia, can be made as long as you wish to have them.

In civil practice we have two types of plastic surgery: (1) cosmetic type, such as hump nose, saddle nose, or a lateral deflection or twist; and (2) reconstruction type due to pathologic changes or injury. These are conditions which are mostly dealt with by men in our line of work (rhinologists) and require very little explanation.

These casts will give you an idea of the usual cosmetic deformities which require correction.

Such a deformity as shown in Fig. 1-*A* is best corrected by refracturing and plating. A large hump of the nose (Fig. 1-*B*) would be dealt with by re-

*Read before the American Society of Orthodontists, Chicago, Ill., April 5-6-7, 1920.

moval of the hump through the interior of the nose. A saddle nose such as shown in Fig. 1-*C* can be dealt with by the introduction of a tibial graft through the interior of the nose. One of the most difficult things to correct is a lateral defect of the nose, Fig. 1-*D*, where the cartilage is missing. In such

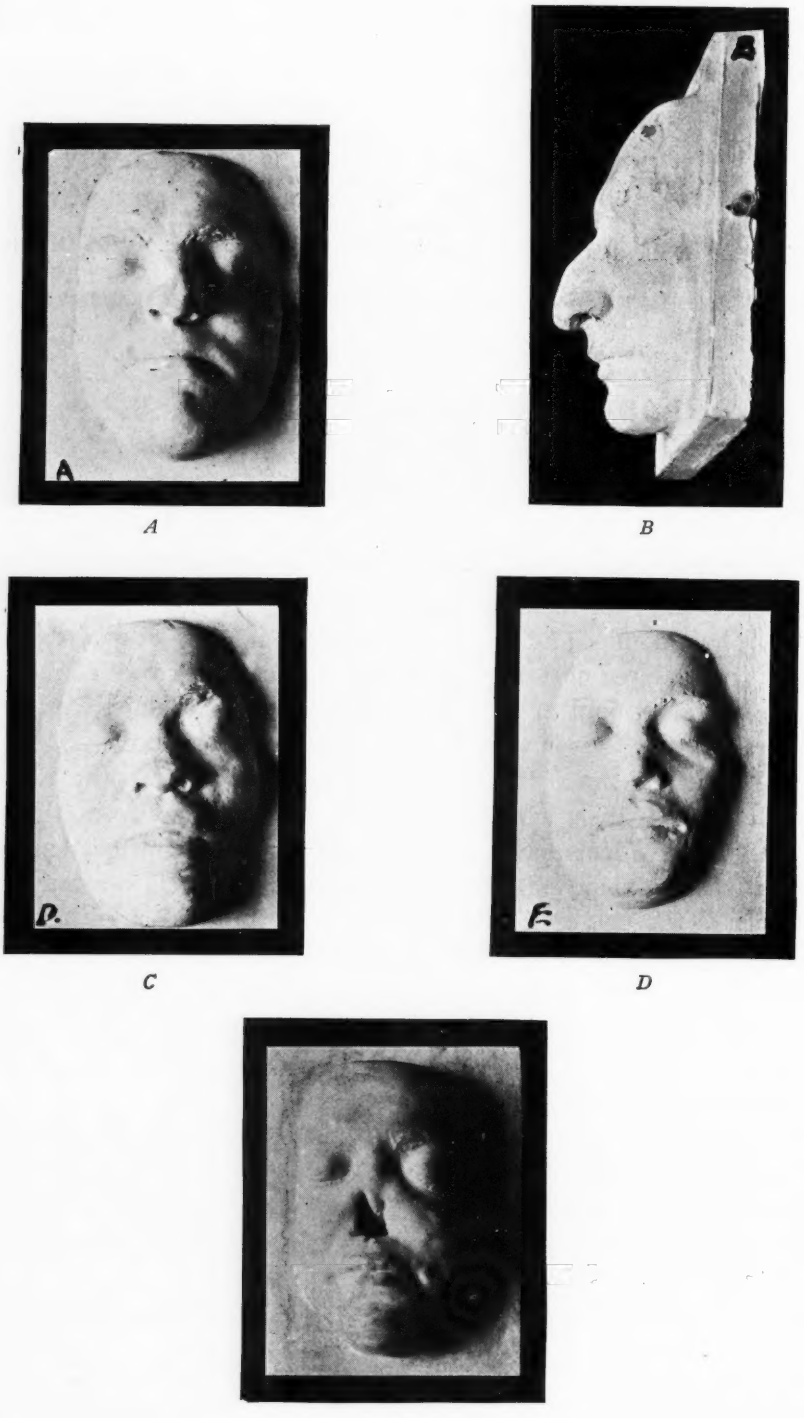


Fig. 1.

a case transplantation of cartilage is used, although the result at best is not very good. A deformity such as that shown in Fig. 1-*E*, where you have marked destruction, is analogous probably to a war deformity and requires a great deal more work than the previously shown cases.

The cases I am going to show are extreme deformities of the face, particularly the nose (pathologic deformities), in which reconstruction has been attempted.

Case I. (Fig. 2.) A young lady who has been the subject of maltreatment. This plate shows what her condition was originally (Fig. 2-*A*). We see many cases of imaginary deformities in people who seek some means of having the deformity corrected and they should be discouraged from such action.

This girl applied to physicians to correct the deformity, which would seem to be a broad tip of the nose, and since no surgeon would do it for her, she consulted a so-called beauty specialist or charlatan who injected a mass

Fig. 2.

of paraffin. The injection of paraffin was followed by a growth of tissue around the paraffin, causing a tumor or paraffinoma. This tumor was not only deforming, but it discolored the skin and became very painful, so that it was necessary for me to remove that material in order to relieve her pain. These pictures show in series (Fig. 2) what was done. I excised the paraffinoma which reached into the orbit, the cheek and down over the lip. Subsequently I used twenty-five to fifty milligrams of radium over the connective tissue to stop this growth. The next step will be a plastic operation, where we shall take the skin either from the arm or some neighboring part of the face.

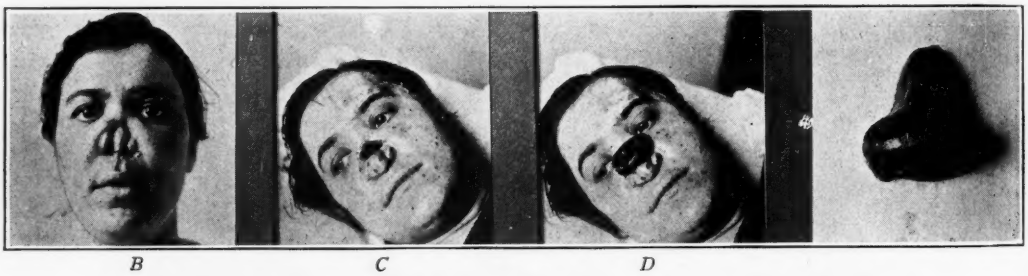
I present this case as warning against the use of injecting paraffin into tissues. One never knows when he is going to strike a subject that will respond to the growth of a paraffinoma which may take on almost malignancy, causing terrific pain. Paraffinoma not only causes pressure on the nerves but

may produce a neuroma and a neuroparaffinoma has been claimed to be malignant. Of course it is not so malignant as a sarcoma or carcinoma.

Case II came to me with the condition as shown in Fig. 3, *A* and *B*, the result of lues.

I proceeded in her case by reconstructing the nose from what was left of

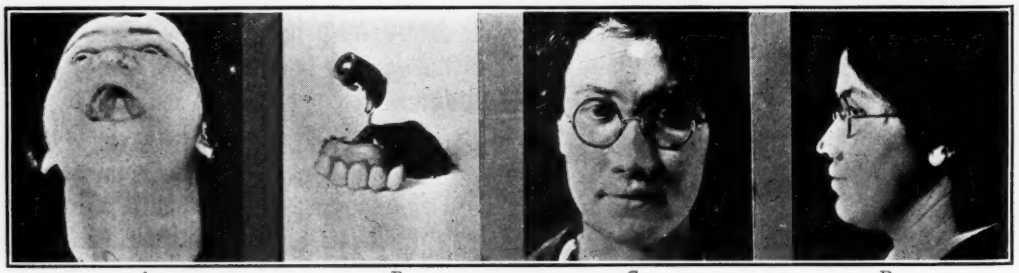
A



B *C* *D*

E

Fig. 3.

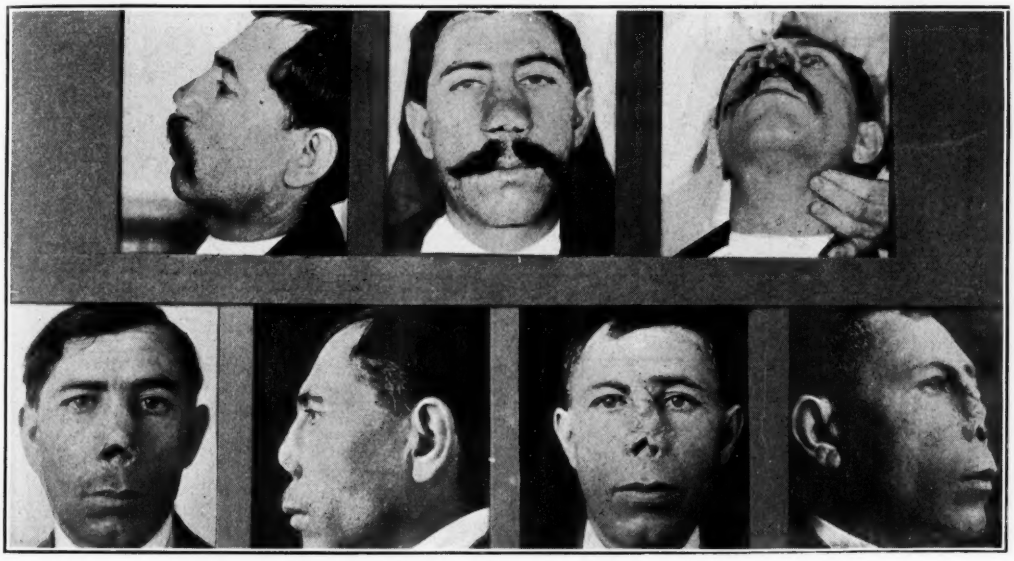


A *B* *C* *D*

Fig. 4.

it, rebuilding the tissues from the neighboring parts (Fig. 3-*B*) and bringing it out so that I formed a sort of tip to the nose (Fig. 3-*B*). I made a hole above the tip of the nose (Fig. 3-*C*), and brought the tip farther down. A triangular flap was brought from the forehead sliding it down and uniting it to the tip of the

nose (*C*). Now comes the further reconstruction of building up of this tip and making the flaps larger to bring the tip of the nose out. She had a perforation of the palate (Fig. 4-*A*) and wore a plate (*B*) which was so made as to push the tip of the nose out. When all reconstructed work is completed a permanent plate will be made with an appliance to supply the support lost



A

B

Fig. 5.

through the lack of the nasal bones. She is now wearing an artificial nose made by Dr. Jesser, until further reconstructive work is performed. (Fig. 4-*C* and *D*.)

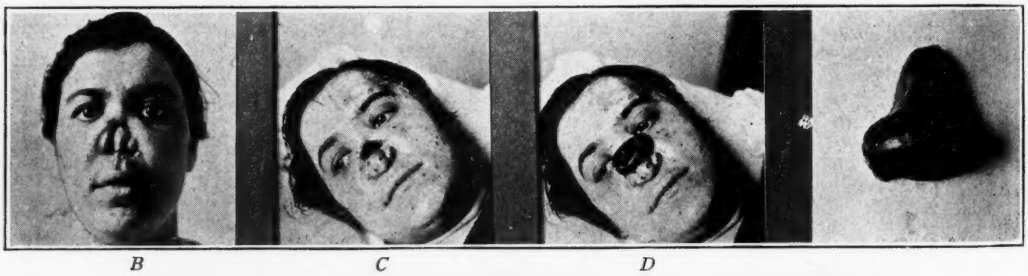
The next case I have to show is an interesting one on account of the pathology. This man came with a true tuberculosis of the anterior part of the

may produce a neuroma and a neuroparaffinoma has been claimed to be malignant. Of course it is not so malignant as a sarcoma or carcinoma.

Case II came to me with the condition as shown in Fig. 3, *A* and *B*, the result of lues.

I proceeded in her case by reconstructing the nose from what was left of

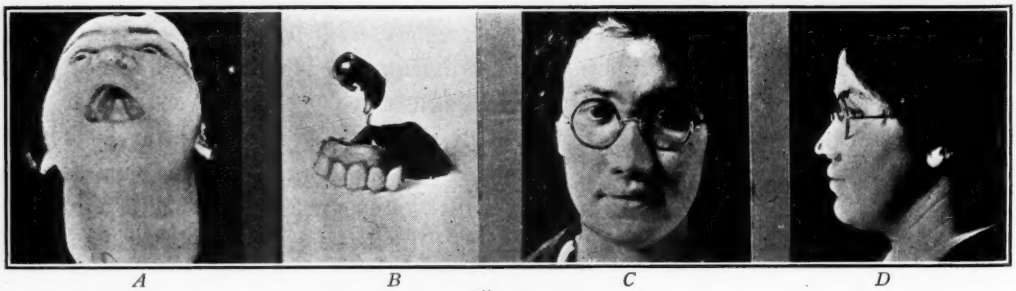
A



B *C* *D*

E

Fig. 3.

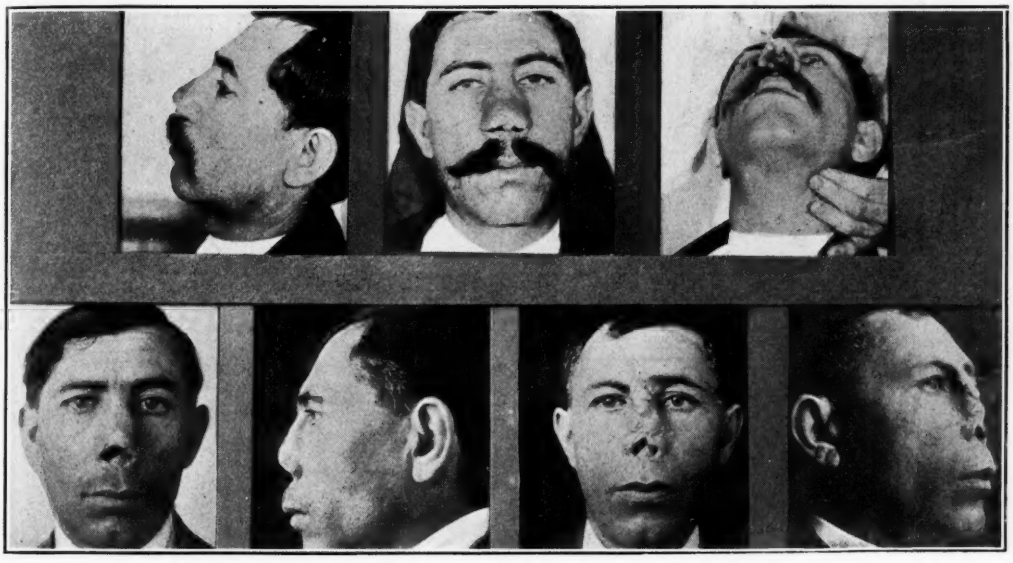


A *B* *C* *D*

Fig. 4.

it, rebuilding the tissues from the neighboring parts (Fig. 3-*B*) and bringing it out so that I formed a sort of tip to the nose (Fig. 3-*B*). I made a hole above the tip of the nose (Fig. 3-*C*), and brought the tip farther down. A triangular flap was brought from the forehead sliding it down and uniting it to the tip of the

nose (*C*). Now comes the further reconstruction of building up of this tip and making the flaps larger to bring the tip of the nose out. She had a perforation of the palate (Fig. 4-*A*) and wore a plate (*B*) which was so made as to push the tip of the nose out. When all reconstructed work is completed a permanent plate will be made with an appliance to supply the support lost



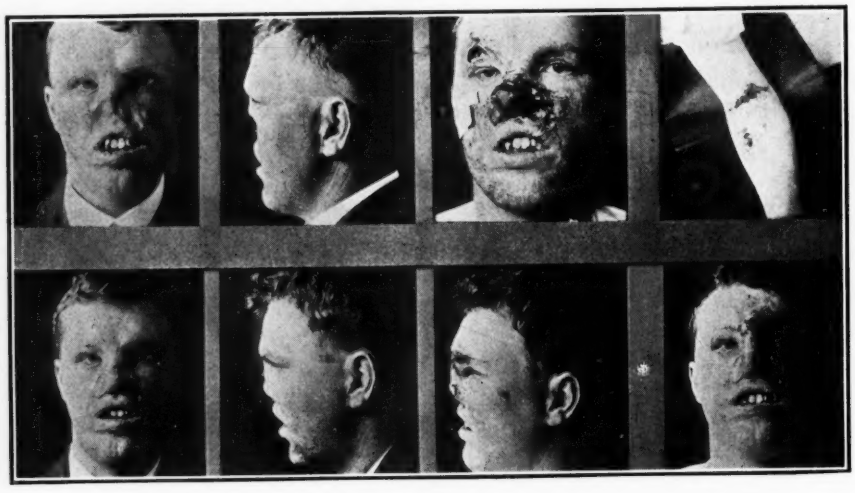
A

B

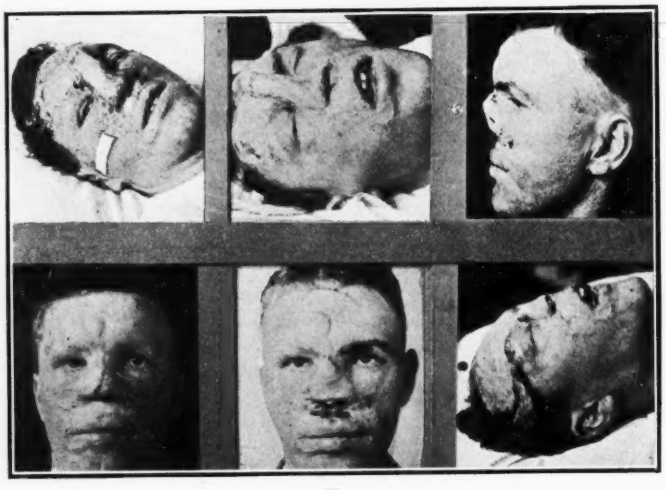
Fig. 5.

through the lack of the nasal bones. She is now wearing an artificial nose made by Dr. Jesser, until further reconstructive work is performed. (Fig. 4-*C* and *D*.)

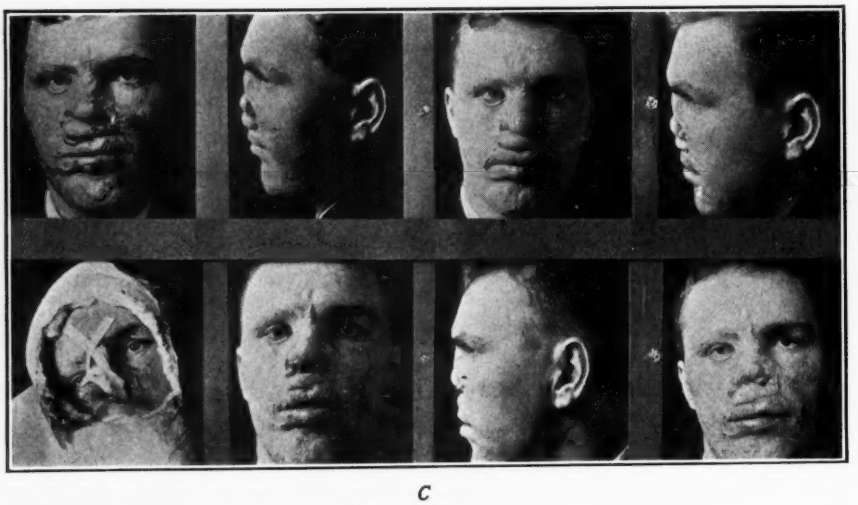
The next case I have to show is an interesting one on account of the pathology. This man came with a true tuberculosis of the anterior part of the



A



B



C

Fig. 6.

nose, which had to be entirely sacrificed both by surgery and radium treatment. (Fig. 5.) The tuberculosis was entirely cured. It is two years since the operation was performed, and now comes the reconstruction. It is a fairly good looking cosmetic nose, although not artistic. Nothing is more gratifying than the appreciation of these patients for what you do for them in a cosmetic way. It is their own nose, and no matter how beautiful the prosthesis they do not want it. They want their own nose. These pictures show as we have proceeded in this case the steps of the various operations. (Fig. 5.) This work consists of rebuilding constantly, taking a little tissue from here and there. We are ready now to do a Wolfe graft, the nose having been lined inside and skin graft outside with fair nutrition. He is now ready to have the bridge and nostrils made.

The next case is interesting from the standpoint of the etiology. When a child this boy had some form of eczema or erythema and the family physician by mistake applied a corrosive substance which destroyed the greater part of the nose as well as the eyelids and lips. As you see by the first picture (Fig. 6) there is no nose and there is very much scarring of the lip and face. These pictures represent the number of operations that he has been subjected to to reconstruct what we have so far. He has a bridge to his nose, a little finger having been used to reconstruct the bony structure. He has an upper lip which we made with a flap from his arm and portion of his eyebrow, which we transplanted from the back of his head, taking pieces of skin (Wolfe grafts) with hair and transplanting them. Some of these did not live, but others have remained. Recently we have made him nostrils. He has a septum, and we are using the inlays of rubber tissue until we have good sized nostrils, so that he can breathe through his nose, next we shall make a columella.

Another interesting feature is the anesthetic. This man has had thirty-three operations, all done under general anesthesia. We must marvel at that, because his blood, urine, kidneys and heart were without any bad effects from the anesthetic, and this contributes something in the way of science from that standpoint. The anesthetics were scopolamine and morphine with a slight amount of chloroform. The patient could not take a local anesthesia.

Fig. 7 shows a cleft palate case. The patient has been operated upon a number of times, cicatrization having taken place making it impossible to do any shifting of tissue, as is usually done. He had a complete cleft which reached far over to the anterior surface near the teeth. I was able by the aid of Federspiel clamps to bring the parts together so that I united the uvula and rest of the soft palate. There was still a large anterior bony perforation which I failed to close and this I recently succeeded in doing. He did not want to wear a plate so that I devised another method by sacrificing the inferior turbinate. I removed half of the posterior end of the inferior turbinate and left it attached anteriorly, freshened the margin of the perforation and sutured the turbinate to the margin with wires. To my great satisfaction the turbinate healed in and closed the palate. In small perforations of the hard palate where the ordinary methods fail, this method should prove very useful.

Here is a young man I show on account of the method used to reach a

large tumor in the postnasal space, a fibrosarcoma which I was able to reach through the palate by slitting the palate on one side of the uvula up to the hard palate, retracting, and delivering the tumor and then leaving the palate open for subsequent x-ray treatments.

While speaking about cleft palates I wish to say that no matter how well the palate is united, they never have the clear distinct voice which it is possible to produce with a prosthesis. They do not seem to have occlusion of the postnasal space, even with all the intensive training they receive, and their articulation is not as good as it might be.

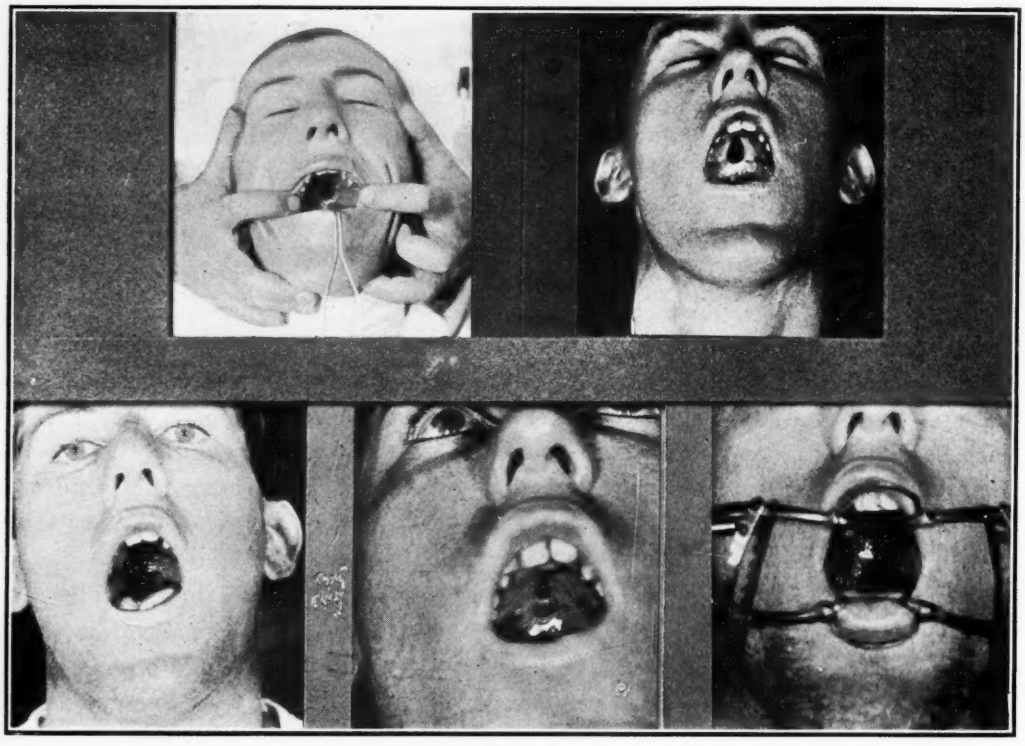


Fig. 7.

DISCUSSION

Major Joseph D. Eby, Washington, D. C.—When I was ordered to the colors in September, 1917, I reported to the School of Plastic Surgery in St. Louis, the first one of its kind, where one of our instructors was Dr. Beck. I had the pleasure as well as honor of obtaining a wonderful amount of information from him in that school. His work was demonstrated on several injected cadavers, freshly prepared, which showed all forms of rhinoplastic and other forms of facial plastic repairs. That was the laying of an excellent foundation for the work which materialized and came into my hands during the last two years of my career.

After the signing of the armistice I was ordered to the Walter Reed Hospital, Washington, D. C., which was designated as one of three institutions for the correction of maxillofacial injuries. One of the institutions was shortly afterward closed. So with my associate, it has been my honor and privilege as a young man and as an orthodontist to serve between 450 to 500 of our wounded boys who needed hospital attention.

Dr. Beck paid a well deserved compliment to Major Gillies, of England, and in our work we have received an abstract of the literature and have been brought in contact with

many men who have treated maxillo-facial injuries. My present associate (Dr. Williams) spent several months with Major Gillies. Through Colonel Logan, I was brought into close personal contact with Major Gillies, the only essayist at the National Dental Association meeting last year, who spoke on maxillo-facial injuries and their treatment.

I feel in the light of my knowledge of the work done by our Allies, as well as by such men as Colonel Blair, Major Schaefer, and last, but not least, Lieutenant-Colonel Robert H. Ivy, of Philadelphia, our United States boys received as good treatment as the soldiers of any other nation from these great and skillful men, and the high character of their surgical and plastic work shows that they need not take off their hats to anybody. (Applause.)

The operation which Dr. Beck spoke of as having been presented by Major Gillies in which pieces of osteoperiosteum containing a portion of the cortical process of the outer plate of the frontal bone are everted by means of a pedicle beneath a soft tissue pattern for nose replacement from the forehead, has been given the name by Major Gillies of the Indian operation, claiming that the Indians had long ago practiced rhinoplasty for certain injuries or deformities.

I did not receive any communication as to what the nature of Dr. Beck's paper would be and what ground he would very likely cover, hence some of my remarks may not be exactly relevant in discussing Dr. Beck's paper, but will show those conditions met with in war surgery.

We have acquired 1500 photographic records of these patients, as well as innumerable wax colored casts and models of all forms. While the British and French literature is in advance of ours, I feel quite sure that within the next year, with the continued preparation of the work done in this country, you will find that a great number of very interesting things will be forthcoming and much better than I am capable of showing here.

An important question for consideration is the one of plastic repair of eyebrows from bullets particularly, as well as loss of substance. Colonel Ivy has been instrumental in making some partial repairs by cutting a small pedicle from the border of the hair line with the broadening of the pedicle, carrying the superficial temporal supply down by suturing the anterior three-fourths of the grafts to the desired position, thus establishing collateral circulation, and the pedicle being returned as much as possible to its original position. One or two slight secondary operations will improve the condition very materially, so that brow plastic is a most effectual means for the location of material.

In some instances of very high explosive fragments, the orbital socket is obliterated, or the orbit has to be enucleated, and some additional pedicle grafting is necessary to stimulate the eyelids or to provide a sulcus to hold the prosthesis space. We must figure on a slit border of a flap that has been thrown up to relieve the ectropium of the lid, and after slitting the border, comb the eyebrow, apply a graft, using some stiffening paste or wax, and a proper strip of material which will carry a heavy skin graft to replace the lost eyelashes.

We have had some remarkable plastic work done in the eye service in cases of phosphorus burns and smokeless powder burns. In some instances the eyes have been burnt terrifically.

I recall one case in which both upper eyelids were completely destroyed, with remarkable restoration following a plastic operation, and save for the absence of the orbicularis palpebrarum muscle and its function in the closure of the eyes, one would hardly realize that plastic repair had been made of the upper lid. This repair was done by everting a pedicle from the cheek so that collateral circulation was picked up, the flap excised and returned.

In another patient a high explosive fragment entered through the parotid gland region in front of the ear, traversed beneath the malar process and the zygomatic fossa and destroyed the nasal process to the right and left superior maxillary bone, and destroyed sufficient of the glabella to cause loss of support. The right superior maxilla is lost. The overlying skin was intact. The tip of the styloid process was saved. The scar was excised and redundant tissue everted into a flap.

There is a very intimate borderline between orthodontia in our study of facial cosmetics and in our ability to aid the plastic surgeon, and we should be perfectly familiar with the

possibilities of his work in order that he may aid us. If that such is true, we have an instance in this particular case.

We have several cases where the half of the missile was through the face, undermining the floor of the orbit, establishing double vision, not destroying the eye, in which we had to elevate the eye. We took cortical bone from the tibia, cutting a horizontal slot in the malar eminence and a corresponding nick in the nasal border of the superior maxilla, and the cortical bone inlaid in position to endeavor to sustain the weight of the eye. The cartilage in that instance would absorb by pressure. Stimulation of this tissue was sufficient. It was first essential to undermine a portion of the face; the entire middle curve of the face was cut into the least, and what the orthodontist could do was to provide anchorage for the nostril and hold it, and later provide a stage for modeling composition to hold a large flap of skin to epithelize the great raw surface.

Of all the wonderful things our beloved Dr. Case has done, his technic for taking impressions and making an artificial velum or soft palate restoration, is one of the best. In the same manner we secure remarkably accurate impressions, making a soft rubber bulb insert, and later an edentulous ridge containing teeth upon which a second insert can be snapped. This patient looks quite himself again.

Where the tip of the styloid is involved in an injury, particularly where the missile has passed through the face and caused at the point of exit great loss, such a case can be handled by the free grafting of fat taken from the abdomen or undermining the skin, or taking the fat from adjacent areas from the pedicle. There is no tendency toward growth of the subcutaneous fascia in the face or abdomen. It is a question always of not having to perform pedicle grafting by bringing skin from remote areas, with possibly excising scar tissue and undermining the adjacent skin and drawing it together.

In presenting these cases, I hope to impress you with the close relation existing between plastic surgery and orthodontia. There are certain cases in which the best results can only be obtained when orthodontic methods are employed to stabilize the parts during repair. If I have given you anything of interest I feel greatly repaid for coming here.

Dr. Joseph C. Beck (closing the discussion).—The cases presented by Major Eby are a revelation to me, because before I went to Europe I had no idea from my reading of the literature that there was such remarkable progress being made in orthodontia and in prosthetic work.

In my visit to the Walter Reed Hospital Colonel Ivy was kind enough to show me everything he had. I met Dr. Schaefer in Baltimore; I visited Fort McHenry, and saw much of Dr. Blair's work in Jefferson. I spent a number of days in these different places to acquaint myself with what had been done in this war. I am sure, one thing that has been accomplished is a more thorough knowledge of mechanics in connection with the support of tissue for plastic surgery. Even now following the war, in the enemy country which I visited after the armistice, particularly Prague, they were not making use of the advances that had been made in plastic surgery. Among the advances that have been made are the osteogenesis that follows implantation and the tubal flaps of Gillies.

I want to correct Major Eby in one statement he made about the so-called Indian operation where he said the Indians were the ones that used these flaps. You will find in the literature that where a flap is taken from the forehead it is known as the Hindu operation.

I agree with what Major Eby said about American records of cases and the importance of their publication, and if the material that has been accumulated can be published in book form, it will prove invaluable to plastic surgeons and orthodontists.

Perhaps I ought to apologize for bringing this subject before you in such an unfinished manner, because had I known the discussion was going to be such as it was, I would have brought with me reports of cases that occurred in my own experience during the war, but I thought the subject I have presented and the cases I have shown would be of more interest to you.

DEPARTMENT OF DENTAL AND ORAL RADIOGRAPHY

Under the Editorial Supervision of

James David McCoy, D.D.S., Los Angeles—Robert H. Ivy, M.D., D.D.S., Washington

B. Frank Gray, D.D.S., San Francisco—C. O. Simpson, M.D., D.D.S., St. Louis.

It is the object of this department to publish each month original articles on dental and oral radiography. The editors earnestly request the cooperation of the profession and will gladly consider for publication papers on this subject of interest to the dental profession. Articles with illustrations especially solicited.

SOME OBSERVATIONS OF THE RADIODONTIST

By L. R. Main, D.D.S., St. Louis, Mo.

THERE has been so much written on the subject of dental x-ray (using this term in general) that it is with considerable hesitancy I attempt to present anything under the title of Radiography. And yet there are some things that come under observation, which I am sure will be of value to all interested in oral diseases.

We are realizing more and more the value of good teeth and that they are so vitally connected with our anatomy that their diseased condition will in many instances affect the whole physical economy.

There is perhaps nothing that has done more to stimulate better dentistry than the advent of the x-ray in dental practice; at the same time, while it has increased our possibilities, it has tremendously increased our responsibilities to our patients, when used as a diagnostic aid in locating dental focal infection which might be an etiologic factor in systemic disturbances. We are face to face with a public demand and also a demand from the medical, as well as from our own profession, to safeguard and conserve the health of our patients to the limit of our ability. For years there has been a universal call from the dentist, for a closer relationship with the medical profession. The greatest step in this direction has been brought about by the intelligent use of the radiogram.

It has been said there is no labor-saving device yet invented, to relieve the pressure in practice of the everyday dentist. This in a measure is true, but I have seen scores of cases where if the x-ray had been resorted to in the beginning of dental operations, it would have saved the operator and patient months of time, also considerable expense and suffering.

Now there is no man among us who is more in sympathy with the problems of the dentist than I, for I well know the difficulties which we daily meet and

know they occupy a large share of our time and no small effort on our part. But in order to progress, we must be unbiased in our judgment and face facts as we find them today. With the coming of the radiogram, we have seen a new form of dentistry develop, until now the things which occupy the mind of the progressive man were wholly undreamed of a decade ago. Yet there are many men who still find it unnecessary to use the x-ray and continue their practice, guessing at what lies at the apex of a devital tooth, instead of advancing with, and using the means obtainable for ascertaining all information possible before treatment is instituted. In Fig. 1 you will note a central incisor which is hopelessly abscessed and this tooth was treated three months before an x-ray was made.

I want to come close to my subject and state some of the things I have observed after using the x-ray as an aid in diagnosis for nearly five years; first, patients, generally speaking, are very easily convinced of the value of a complete radiodontic examination to enable the dentist to intelligently diag-

Fig. 1.—Upper right central.

nose and treat their teeth, and usually they do not see the necessity of a partial examination only, for example, sometimes patients are referred for an x-ray of the upper teeth, when the neuralgia is along the course of the first and second branches of the fifth nerve and the teeth are suspected as a possible cause. I have had the same experience when the eyes were affected. It was just as necessary to eliminate a focus of infection around a lower tooth, as an upper tooth, even though the symptoms of infection are in the orbital region.

Patients do not realize, however, much difference between a complete and thorough radiodontic examination and an examination which simply shows the teeth with practically no real information. This should be brought to their attention by the dentist. Figs. 2 and 3 are equally good radiograms, but Fig. 2 is a detriment to the patient as well as the dentist, as it gives no information because the angle is wrong. Fig. 3, the same case taken from the correct angle, shows definite areas of radiolucency on both the central and lateral. One will again note Figs. 4 and 5, one radiogram is as clear as the other, but the area of rarefaction in Fig. 4 falls at the apex of the lateral, a vital and normal tooth, because the angle is wrong. In Fig. 5 the area is on the central, a devitalized tooth, and is taken from the correct angle. In many cases it is

impossible to make a diagnosis without considerable knowledge of dental anatomy and pathology and also by the constant use of the vitality test.

Many times radiodontic examinations have been made where patients were referred by physicians, because of systemic disturbances. All other examinations being negative, the teeth were suspected as a factor. In many of these cases I have found several areas of rarefaction, which were no doubt the result of infection. The patients tell us that their dentist had just completed going over their teeth and in some cases they have just finished paying a good-sized bill, and now it seems advisable to have most, if not all, of these teeth extracted. This should impress upon us the necessity of first making a full diagnosis of all cases before we commence dental construction, to avoid such

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

unpleasant happenings. These cases frequently give rise to the question, "Is the physician overstepping his bounds when he advises extraction of teeth, after an honest effort is made at diagnosis?" The question again comes up, "Are we extracting too many teeth?" I fully realize in many instances this is true. And all too often teeth are sacrificed on the advice of many physicians and dentists without as complete information as could be had, simply because some one else was relieved of similar symptoms by such procedure. But again, we as dentists frequently find fault with the medical man on his advice to extract certain teeth because it seems advisable under the existing

conditions. All too often when the medical man suspects the teeth as a factor in some systemic disturbance and refers his patient to a dentist, we give them a clinical examination and as there is no pain about the teeth we return a negative report. Many and many times physicians ask what they are to do in such cases. Frequently every other examination is negative, the patient is suffering from metastatic infection, clinical examination of the mouth reveals several apparent devital teeth. Has not the physician a right to a radiodontic examination? Is not the patient entitled to all information possible in his own case? Could there be any objection to securing all information possible so that an intelligent diagnosis and possibly a prognosis could be made? There sometimes is.

Recently I had two experiences which might be of interest. One woman was referred two different times to her dentist by her physician, stating her symptoms and asking his full cooperation in finding the cause for her neuralgia, of which she had been suffering for fifteen years. Both times a clinical examination was made and a negative report returned. Finally she was referred for an x-ray examination. The trouble was located, corrected, and her neuralgia disappeared. The other case, a man of fifty-six, was brought to the office in a taxi because of his weak physical condition. He also said, because of the uncertain complications, his physician referred him to his dentist, who made a clinical examination only and also returned a negative report. When a full and complete examination was made, with the aid of radiograms, the cause of his trouble was located and when removed, perfect recovery followed. So again the quetsion is asked, "Is the physician going too far in his recommendations?" Or is it a question of, "Are we going far enough in dental diagnosis?" These two cases are simply typical and can be duplicated many times in any office, where an honest effort is made in diagnosing.

To my mind one of the greatest detriments to an x-ray examination of the teeth and jaws is the prevalence of this examination by those who are not thoroughly trained in this particular field of work. The mistakes made are simply appalling and some of the radiodontic interpretations would be a joke if it were not so serious. Just the other day I saw two cases which are so extreme as to sound unbelievable, but nevertheless true. Both cases were taken on large 8″x10″ plates. First, a man about forty years of age had a fistulous discharge, no doubt the result of an abscessed lower first molar, a condition which the dentist sees every day of his life. A radiogram was made at such an angle as to throw the shadow of the pharynx across the mandible in the region of the premolars and first and second molars and without another exposure a diagnosis of necrosis of the mandible was made, apparently because of the darkened area in this region caused by the pharynx. The jaw was operated on, three vital teeth extracted, and the bone "scraped" searching for the necrotic bone, which was not found. Another radiogram was then made by a dentist, who found the bone entirely normal with the exception of the mutilated area caused by the operation. In the second case, a woman about forty-five years of age had her lower teeth extracted while visiting in another state. On her return home, several small pieces of process came through the gums, as is frequently the case, and she became uneasy. After

consulting a doctor here, he deemed it advisable to radiograph the mandible, which was good practice. The plate was very, very much overexposed and of course the bone appeared dark, almost too dark to trace the outline of the mandible, and a diagnosis of cancer was made and the patient was advised to go to the hospital for an operation at once. This she did not do, but instead consulted a pyorrhea specialist who, after examining the radiogram, advised her to consult a radiodontist and have her jaw x-rayed with the proper exposure, and the result showed normal bone throughout.

We find conditions in oral radiography which are sometimes responsible for systemic disturbances beside periapical infection. Many times when all the teeth are vital, it is considered unwise and unnecessary to make radiodontic examinations. One of these conditions is pyorrhea. In all cases of pyorrhea the radiogram is advisable, and in severe cases it is imperative before an intelligent prognosis can be made. The old theory that the infection from around these teeth is taken care of, when swallowed, by the gastric juice is perhaps true, but some infection is also carried into the circulation and many symptoms of secondary infections clear up entirely when vital, but pyorrhea teeth are treated or extracted.

A *B*

Fig. 6.—*A*. Lower left. *B*. Lower left.

Another condition, which is perhaps given little consideration, is the possibilities of nerve reflexes as a result of hypercementosis, impacted teeth, or too long retention of deciduous teeth. Many cases of headaches are the result of hypercementosis, as this is usually due to chronic irritation, causing unusual activity of the cementoblasts.

A few years ago, a young woman came to the office for an examination and an impacted upper third molar was located. This tooth was removed and she returned after a few days and said she had stopped vomiting. On questioning, it was found she had had spells of vomiting for five years and nothing thus far had relieved her until the impacted third molar had been removed. While I am conscious the so-called diseases of dentition are greatly overrated, still there are cases where the first dentition causes a great many gastric disturbances. So is it too far-fetched to suppose that pressure exerted by impacted or unerupted teeth on the nerve endings of the trifacial could not give rise to a reflex through the pneumogastric nerve and affect digestion?

In Fig. 6 will be noted the first permanent and first and second temporary molars in position, with the premolars well locked under the temporary molars.

Also in this case, there is no resorption of the root ends of the temporary teeth. History: Boy ten years of age, very anemic, spells of vomiting, diarrhea, lasting over a period of three months, the cause of which could not be ascertained. Teeth suspected, but clinical examination was negative, as there was no apparent decay and all teeth were vital. Finally an x-ray examination was made and the eight premolars were located as shown, not erupted because of the temporary molars being in position. Is it not possible that because of too long retention of these temporary teeth, the pressure on the inferior dental nerve, at the root ends of the premolars was severe enough to produce a reflex to the pneumogastric? It was deemed advisable to extract all temporary molars and the exodontist afterwards stated these teeth were as difficult to remove as the average permanent tooth. Six weeks later the mother reported the child had not vomited since the loss of the teeth.

I do not intend being critical, except as it may provoke progress in our thinking. To my mind, the greatest service we can render the human family is to conserve health, and this is in no small measure possible in the practice of dentistry. The fact that dental disturbances do influence the general health is accepted and we must ride with the tide and not pull against it. For in preventing and eliminating foci of infection about the teeth, wherever possible, we at least strengthen the patient's resistance by so much. In so doing, preventive dentistry and in many instances preventive medicine will go hand in hand.

ABSTRACT OF CURRENT LITERATURE

Covering Such Subjects as

ORTHODONTIA — ORAL SURGERY — SURGICAL ORTHODONTIA — DENTAL RADIOGRAPHY

It is the purpose of this JOURNAL to review so far as possible the most important literature as it appears in English and Foreign periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the publishers.

Mechanics in Orthodontia, from a Modern Aspect. Milo Hellman. The Dental Cosmos, 1920, lxii, No. 12, p. 1385.

The ideas advanced in this contribution are summed up by the author as follows: Orthodontia as a whole can under *no* circumstances be regarded as a problem in mechanics alone. The processes involved in the natural movement of the teeth are intimately associated with inherent tendencies of the teeth and their supporting environment. The tissues involved in orthodontic procedure do respond to mechanical forces, but not in accordance with physical laws. The teeth are moved artificially by processes of a *biochemical* nature. The construction of orthodontic appliances constitutes the only mechanical process in orthodontia and requires no extraordinary skill or special engineering or mathematical training. The manipulation of orthodontic devices in the treatment of malocclusion of the teeth is an art, and it is of considerable advantage to be endowed with special artistic talents besides mechanical skill in order to excel. Orthodontic treatment can be carried out by the dentist, but only in a subordinate manner, i.e., under the special supervision of an expert, upright, honest and sincere orthodontist; one who has the interests of the patient at heart and is convinced to the best of his judgment that in exceptional cases it can be furthered by a combined effort. To control the efficiency of an appliance is what taxes the utmost ability of an orthodontist; for an appliance will do what we desire it to do and at the same time it will do some other things besides. Again, an appliance may be prevented from doing some things that we do not wish it to do, but fail to do what we desire it to accomplish. It is only by the cultivation of absolute mastery over the possibilities of an appliance that it becomes an instrument to express our will in just proportion as necessities demand. Viewed from this aspect, the treatment of malocclusion of the teeth becomes an art that ranks foremost in the art of healing.

Orthodontia—The Ribbon-Arch Mechanism and Some New Auxiliary Instruments. E. H. Angle. The Dental Cosmos, 1920, lxii, Nos. 10-11, p. 1157.

The author in this contribution elaborates further upon the ribbon-arch-bracket mechanism introduced by him in 1916 and which has been accorded a widely favorable reception. The principle of this mechanism may be advan-

tageously extended to apply in retention. Some other orthodontic inventions and ideas are offered by him which are for the most part designed to assist directly or indirectly in the employment of this mechanism and to facilitate as well as improve the work of orthodontists. The ribbon arch is light and delicate, this fact explaining its even and continuous action; when it is used, the stimulation of the cells is nearly physiologic. It therefore provides sufficient power to meet all demands, especially for widening and narrowing dental arches, unless the mistake is made of accidentally bending it in such a way as to reduce its power when the arch is finally placed in position upon the teeth. The twist or torque of those portions of the arch that lie within the curvilinear sheaths is a force quite as powerful as the usual simple expansive or contractile force of the arch and should be utilized by giving the ends of the arch the proper twists before inserting them in the sheaths, so that they will bind for a tilting outward or inward movement of the crowns of the anchor teeth when this is needed. The power to be gained from the twist in the arch applies equally to the relation of the arch with the brackets as to its relation with the sheaths. Orthodontic efficiency and success depend largely on understanding these problems in dynamics. When the two forces conflict, through a faulty adjustment of the arch, they will to a certain extent neutralize each other. Aside from lateral movement of the teeth outward, the power of the arch is abundant for all other movements of teeth, both of roots and crowns, the tooth movements being prompt and satisfactory. This is due to the great range of elasticity in the arch, coupled with the very ideal attachment of the teeth to the arch, which firmly controls their movement, but which at the same time permits them desirable freedom. In view of the fact that without proper supervision the teeth may move too far, a still more delicate arch may prove more advantageous in certain cases. The bracket attachment can also be used as a retaining mechanism. In the first application of the arch, and for gaining the necessary lateral twist in the arch to effect rotation, or forming the decided bend for engaging a bracket on a tooth that is in pronounced lingual occlusion, the special pair of ribbon-arch seating pliers devised by the author will be found of great assistance. Lock pins made of a fine quality of brass are the most desirable in the opinion of the author; they are best clinched in the brackets by drawing them sharply at right angles to the latter and clipping the bent pin off close to the side of the bracket, leaving no projection. Minute pincutters have been devised by the author for cutting the pin close to the side of the bracket without disturbing the bend. Attention is called to the occasional necessity for the employment of strong little cleats, which must be properly located and soldered to prove efficient.

By means of the delicate new curvilinear sheaths of the anchor bands, the arch can be prevented from working forward and the friction nuts can be kept firmly seated within their attachments. Moreover, the arch, without auxiliary attachments, may be caused to work distally within such sheaths when this is desired, even to exerting considerable force for the retraction of prominent incisors. Another advantage in the use of the curved sheath is that the ends of the arch can be left to project well through the distal ends of the sheaths,

at least in the beginning, instead of cutting them off close, thus not only giving a longer arch which may be useful later on as the dental arch is enlarged, but offering longer continued resistance to the natural tendency of the arch to forward displacement as its ends gradually travel forward in the sheaths through tightening the nuts than would be the case with a shorter arch. Finally, the curved sheath interferes far less than the straight sheath with the functions of the cheeks.

Plain bands on anterior teeth are most accurately placed, and with the best cosmetic effect, by first indicating with a lead pencil mark on the moist surface of the enamel of all the teeth to be banded the position that the incisal margin of each band should occupy. The bands are then easily pinched and shaped so as to conform to these lines, with the result that after the teeth have been gradually moved into conformity with the line of occlusion, the bands as well as the teeth will assume harmony and balance of relation. A new, very perfect and efficient instrument has been devised by the author for holding and pinching the band material about a tooth. The band material is cut between the beaks of the new band-forming pliers and a most accurately fitting band is finally obtained by means of this method of band making. As regards the fitting of bands to molars, the author believes it is not possible to gain the proper adaptation of a plain band to a normal molar tooth, this being only possible with a clamp band, and then only when the band is most carefully and skilfully fitted. Within the past year the author has worked out a method for adjusting and fitting the clamp band which insures the most perfect adaptation of the band to the enamel, not only at the swell of the crown, but equally at the gingival margin, thus closely conforming to the physiologic requirements of all the tissues, as well as affording the greatest firmness of attachment. The new protective medium for attaching the bands, instead of cement, is paraffin, which possesses possible advantages over cement for molar bands, but the superiority of which remains to be proved by the test of time. It has been used in the author's practice for about eight months, with satisfaction.

The wire ligature must be correctly applied in order to gain the full amount of force desired and to maintain it continuously; the twist being used only as a means of locking the strands and holding the tension which is gained otherwise. A ligature or any other attachment can be efficient for the control of force only in proportion to its firmness and its faithfulness in maintaining tension. The author's new instrument is recommended for the accurate and efficient application of the wire ligature as well as for the even and painless control of the force in the placing of the ligatures.

A movable work table, suited to the needs of the modern orthodontist, planned by the author, is now in use among a number of his former students, and is making good as an adjuvant to modern orthodontic work and as an addition to the general appearance of the operating room. For the production of accurate models of the teeth of patients, the hard brass blade of the model plane used in this work is advantageously faced with steel. The difficulty of impression taking is lessened by a modification of the impression tray for which the illustrations in the original article should be consulted. The ribbon arch and its attachments may be reduced in size and strength in order to serve

efficiently for the retention of teeth after they have been moved into the desired positions. A more delicate arch-bracket mechanism is useful for the correction of malpositions of deciduous teeth or recently erupted permanent teeth in mixed dentures. The most natural place for the application and operation of active orthodontic mechanism is labially and buccally to the teeth, as there is here far greater opportunity for the freedom of force and for force control as compared with the much more restricted lingual region of the dental arch. Instances may occasionally arise, however, where lingual mechanism would be more advisable, so that the author does not mean to restrict active mechanism to the labial and buccal surfaces of the teeth.

Lack of Facio-Cranial Development from Endocrine Insufficiency. P. Robin. Comptes rendus hebdomadaries des séances de la Société de biologie, 1920, lxxxiii.

Functional insufficiencies of the endocrine glands may seriously affect the shape and size of the bones of the face and skull, thus inducing esthetic changes and functional disturbances, proportionate to the gravity of the causative lesions. The author for more than twenty years has been treating the irregularities of the jaws and the dental arches, which are usually the first signs of lack of facio-cranial development, by means of functional methods, and more especially by organo-therapeutic measures; with very favorable results in the form of improved appearance of the face and relief of functional disturbances of the buccal and nasopharyngeal cavities. It is a noteworthy fact that the bones of the face and the skull are nearly always attacked as a result of pluriglandular insufficiency, the most prominent superficial changes being those shown in the irregularities of the dental arches, as well as protrusion or retraction of the chin. The lack of development in the face or skull corresponds to a lack of development of the important underlying sinuses, which causes compression of the vascular and nervous structures passing through or beneath them, with resulting impairment of the mechanisms of respiration, digestion, sight, hearing, smell, speech, and last, but not least, mastication.

Osteitis of the Lower Jaw in the Course of Eruption of Wisdom Teeth. Guilly. La Revue de Stomatologie, 1920, xxii, No. 8, p. 456.

The author reports three cases concerning two men of thirty-five and twenty-nine years, respectively, and a young woman of twenty years, who were attacked by osteitis of the lower jaw in the course of eruption of wisdom teeth. In these observations, the pathogenic agents derived from the buccal cavity directly reached the pericoronary sac, the cellular tissue, and the maxillary bone. In the first case, where the cervical glands were inflamed and swollen, the infection travelled by the lymphatic route to the cervical glands. The first disturbances concerned the mucosa and were followed by symptoms of bone-involvement. Lockjaw, with pain, is one of the earliest clinical manifestations. It is originally a defensive contraction of the masticator muscles which rapidly disappears if the infection subsides. But an infection of more prolonged standing becomes propagated through the cellular tissue to the masticator muscles

and gives rise to myositis which is sometimes very obstinate, due to cicatricial contraction of the muscles. In the author's cases, although these were of several months' standing, the lockjaw did not reach this degree of severity and rapidly subsided after the elimination of the sequestrum and the disappearance of the suppuration. Neuralgia was present in all these cases, located at the angle of the jaw, with multiple radiations, chiefly towards the neck and ear. The persistence of pain after extraction is an important sign, being not infrequently referable to bony complications. The infection as it becomes propagated from the pericoronary cavity to the cellular and bony tissue, manifests itself by swelling of the tissues which often suppurates very rapidly. The gathering pus tends to rush the subcutaneous cellular tissue and to open externally, which should be guarded against as well as possible. In the great majority of cases, immediate extraction of the responsible wisdom tooth is indicated, when serious symptoms are present, and its removal is almost invariably followed by rapid and complete recovery. Alveolar curettage is an indispensable supplementary procedure in infected cases.

Epithelioma of the Buccal Mucosa. L. Imbert. Marseille Médical, 1919, lvi, p. 123.

Cancer of the buccal mucosa is perhaps slightly less frequent than cancer of the tongue and represents a very uncommon disease of great malignancy, with well-marked and early glandular involvement. The primary nodule remains undetected for a long time and is generally situated behind the commissure, promptly spreading in the different directions open to it: (1) Over the entire extent of the mucosa, especially downwards; (2) on the gums, whence it reaches one of the jaws, preferably the lower; (3) on the skin, the tumor ulcerating through the cheek and appearing on the outside in the form of an ulcerating neoplastic proliferation; (4) to the glands, usually the submaxillary glands. The teeth are almost invariably carious in these cases, but instead of referring these patients to a stomatologist before surgical interference, it seems preferable to perform the necessary dental extractions in the course of the operation. It goes without saying that all carious teeth and fragments should be removed, but the author considers it a good routine procedure to extract all the upper or lower molars. This precautionary measure guards against the frequent and practically constant recurrence in so far as these are hastened by contact with the teeth in a mouth where cleanliness is very difficult to maintain after the operation. Resections of the superior or inferior maxilla were never required in the author's personal experience, and the recurrences invariably occurred in the soft parts or in the glands. The operation, when the skin is not ulcerated, begins with a large and deep incision which continues to the cleft of the mouth as far as the region of the ear-lobule, following the interdental space. Two flaps are thus obtained, an upper and a lower one, which on being turned back permit a very free exposure of the tumor. When the skin is involved, or merely threatened, the single incision is replaced by a double incision which encircles the neoplasm above and below, widely opening the mouth. This first step provides very good access and nearly always permits a complete extirpation. The formation of the two flaps is followed by

resection of all the neoplastic or merely suspicious tissues; keeping in mind the fact that many recurrences are observed in the soft parts. In case the underlying bone appears suspicious, it should be extensively scraped, above and below. If enough tissue is left behind, the gap is simply closed, after establishing the labial commissure; otherwise, a more or less rectangular flap is prepared for the closure of the gap. The extirpation of the submaxillary glands, when these are involved, is an indispensable part of the operation. The immediate results are favorable, and the patients make a good recovery, but remain exposed to the two-fold danger of constriction of the jaws, and recurrence, which is common. The tumors may reappear in the preserved soft parts, in the glands, or very often in both these localities together. Constriction is also practically constant in these cases, for even when a very large flap has been applied, the absence of a mucous covering on its deep surface gives rise to adhesions which are very difficult of control. The author utilizes for this purpose the dilators in use for the treatment of constriction after-war-injuries, especially wooden wedges which the patients introduce themselves between the jaws, in the morning and at night, with the result that a certain degree of buccal opening is maintained.

Conduction Anesthesia of the Inferior Dental Nerve. J. Bercher. Paris Médical, 1920, x, No. 36, p. 193.

The author emphasizes that conduction anesthesia at the level of Spix's spine is technically simple and devoid of danger, while its results are absolutely reliable and complete. In dental practice, painful interventions on the lower jaw are a matter of everyday occurrence, such as difficult extractions of molar teeth, pulpectomies, scraping of osteitic foci, removal of tumors of all kinds, reduction of recent fractures for fixation of the fragments, and still more frequently, the often difficult and lengthy avulsion of wisdom teeth. For their correct performance, all these operations require a perfect anesthesia. The inferior dental nerve supplies the lower jaw as well as its teeth and the mucosa which covers it. Derived from the inferior maxillary nerve, this nerve trunk penetrates into the body of the bone at the level of Spix's spine, which covers the posterior orifice of the dental canal. Precisely at this point it should be sought and reached, in order to obtain total anesthesia of the horizontal ramus and the angle of the lower jaw. The author's choice of an anesthetic solution is a 2 per cent Novocaine solution with addition of a drop of adrenalin 1.1000 per c.c. About 4 c.c. of anesthetic solution are required to produce a thorough loss of sensibility, but this dose is a moderate one, which may be exceeded, up to 10 c.c., if desirable. A sterilized glass syringe, holding 5 c.c., armed with a fine platinum needle 7 cm. long, constitutes the only equipment needed for the application of anesthesia of the inferior dental nerve. After the fluid has been injected, from five to fifteen minutes must be allowed to elapse before the infiltration of the nerve-trunk is complete. The onset of anesthesia is tested by exploring the sensibility of the gingival mucosa. A properly applied anesthesia usually suspends at the same time the sensibility of the lingual and auriculotemporal nerves. The duration of the anesthesia varies according to the injected dose, from thirty minutes to three hours.

The Innervation of the Soft Palate. M. Inouye. The China Medical Journal, 1920, xxxiv, No. 4, p. 58. (Department of Anatomy, Tokyo Imperial University, Japan.)

The author's investigations concerned the motor nerves of the soft palate, as well as the relation between the soft palate and paralysis of the facial nerve. His observations were obtained by the anatomic and comparative anatomic methods, embryologic research, and physiologic experiments upon five monkeys in the form of electrical irritation of the trigeminal nerve and the pharyngeal plexus. On comparing the results, almost all were found to agree perfectly, so that the observations can be summarized as follows: The muscle of the uvula is supplied by the posterior palatine nerve which is a branch of the second division of the trigeminal nerve. The levator muscle of the palatine velum is innervated by the pharyngeal plexus, and probably also by a branch of the posterior palatine nerve, sometimes also by the middle palatine nerve. The motor fibers which are contained in the palatine nerves are probably derived from the root of the trigeminal nerve. The author's anatomic investigations would seem to show that the motor fibers of the palatine nerves came from the second division of the trigeminal nerve, pass through the sphenopalatine ganglion and supply the soft palate. His physiologic experiments showed, in one of the five monkeys experimented on, that the soft palate moved at the electric irritation of the trigeminal nerve. Furthermore, recent clinical observation also indicated that the soft palate is not affected by a paralysis of the facial nerve. Some motor fibers of the trigeminal nerve presumably pass not only through the third division, but also through the second division to the soft palate, and they do not come from the facial nerve. The muscle of the uvula is innervated by way of the palatine nerves, ciliary ganglion and second division of the trigeminal nerve.

Primary Tuberculosis of the Buccal Mucosa. B. Bernstein. Zahntechnische Rundschau, 1920, xxix, No. 37, p. 432.

Primary tuberculosis may affect any portion of the buccal mucosa, although the frequency of localization varies greatly in individual cases. The tongue and the hard palate are most frequently attacked, whereas the mucosa of the cheeks is only rarely involved. Affections of the gums rank about halfway in order of frequency. All ages and both sexes are subject to the disease, but the patients are usually past thirty years of age, and men are more likely to be attacked than women. According to the author's investigation of the literature, together with a personal observation, among 251 cases of tuberculosis of the buccal mucosa, 75 cases were to be regarded as primary, making about 30 per cent. The evolution of the tuberculous lesion often begins at first with thickening and softening of the mucosa, the diseased locality contrasting sharply from the healthy surroundings. As a rule, however, small roughened nodules which promptly break down again are seen at an early stage, constituting tuberculous ulcers with irregular, superficial, or deeper ulcerations. Whereas, in luetic ulcers the margins are sharply outlined, punched out, as it were, tuberculous ulcers present irregular, undermined, overlapping borders, of an

eroded appearance, surrounded by a close circle of small, red granulations, which are absolutely characteristic. The floor of these ulcers looks lardaceous and often presents miliary and submiliary nodules. Similar nodules often originate also in the near surroundings and likewise undergo disintegration, finally giving rise to a large, grayish, ulcerated surface, which can very early be misinterpreted as a luetic lesion. As to the etiology, particularly in primary tuberculosis of the buccal mucosa, an infection with tuberculous milk enters into consideration, the transmission of animal tuberculosis to man having been proved possible. A case of primary tuberculosis of the buccal mucosa due to infection with milk containing bacilli of bovine tuberculosis was described by Weber in 1907. The possibility of autoinoculation is illustrated by another case in which a hospital nurse infected herself by a needle which had dropped into tuberculous sputum.

The resulting disturbances are relatively slight, especially in primary tuberculosis of the buccal mucosa. The patients complain of excessive salivation, a burning sensation, and a bad taste in the mouth. Pain is not as a rule very severe. An offensive order is almost invariably present, especially in extensive disintegrating processes. In contradistinction to tuberculosis of the buccal mucosa of secondary origin, the prognosis is almost uniformly favorable in primary cases. Timely recognition and proper treatment will usually guard against recurrence. Local treatment alone enters into consideration as a therapeutic measure in primary tuberculosis of the buccal mucosa. Operative removal of the tuberculous focus, by excision or cauterization, is perhaps the most promising, but as the operation has to extend into healthy tissue, a more or less considerable formation of scar-tissue is often left behind, which may lead to disfigurement and functional impairment. Radio-active substances have also been advantageously used in the treatment of tuberculosis of the buccal mucosa. In the author's case, concerning an otherwise healthy young woman of 21 years, with a tuberculous ulcer on the inside of the lower lip, the size of a bean, a cure was obtained by means of combined, almost daily, treatment with 50 per cent lactic acid and sunlight radiation.

A Case of Compound Comminuted Fracture of the Inferior Maxilla. J. N. Parr. Transactions of the Indiana State Medical Society, 1868, xviii, 75.

"On June 25, 1866, I was called in haste to see a young man on whom an old log church had fallen, while he and others were trying to remove it. He was taken out of the rubbish almost dead, but had revived by the time I got there. I found, upon examination, that the submaxillary bone was fractured in three places, viz., on the left side, the neck, on the right, the body, about half an inch from the symphysis; and the third, about midway between this and the angle. The soft parts embracing the integument and buccinator muscle were torn in two most of the way from the commissure of the lips to the ear. Finding it impossible to adjust the parts, hold them, and bandage them alone, I called medical assistance. There was nothing new in the treatment. The only, or chief trouble was to get the loose fragment between the second and third fracture to stay in its place. For this purpose we adjusted it, and then tied the teeth nearest the points of fracture together with a silk thread. The

soft parts were stitched, and all the fragments of the lower jaw brought in proper coaptation with the upper. Then a single broad bandage, so tight that it was impossible for the teeth to slip upon each other, was passed under the jaw and over the top of the head. The patient lived on fluids about one month, and made an excellent recovery, leaving no deformity whatever. The point of interest is, the simple means by which the parts were held together; no clumsy apparatus."

The Treatment of Congenital Lateral Labial Clefts. (So-called Hare-lip). R. Drachter. Centralblatt für Chirurgie, 1920, xlvii, p. 194.

The author's procedure is based upon many years' experience on numerous cases of congenital lateral labial cleft, the operation having been found of great value as a routine measure for all cases of unilateral congenital hare-lip, simple, as well as complicated. In the presence of lip-cleft alone, or lip-cleft with alveolar cleft, but without palatine cleft, it is best to wait a few months, if there is no demonstrable interference with the patient's health due to the hare-lip, in the form of respiratory or gastrointestinal disturbances. The operation can be performed under more favorable circumstances, in so far as the infantile organism has become more resistant, and the thickness of the lip has essentially increased. Hare-lip of the first and second degree requires early operation only in exceptional cases, and these children are best not operated upon until the end of the first six months of life. In the presence of lip-cleft with alveolar and palatine cleft, the operation should be performed as soon as it offers prospects of complete success, for the closure of the labial cleft in these cases means the removal of a condition injurious to the general health. Moreover, dating from the instant of junction of the upper lip, the closure of the alveolar gap and narrowing of the gap in the hard palate follow automatically. The operation promises to be entirely successful when the child is about six to eight weeks old, when its weight increases in proportion to the age and size, and when other diseases, such as fever, etc., are absent. The work is done under local anesthesia; not only the portions of the lip adjacent to the gap-margins should be rendered anesthetic, but also the region where the labial mucosa passes to the upper jaw. The skin of the field of operation must be thoroughly disinfected by washing with alcohol. The rules of asepsis must be strictly observed during the entire intervention. It is not advisable to operate upon the hanging head, on account of the increased hemorrhage, the patient should either be held in the vertical position, or be placed upon the operating table in an approximately horizontal position. The technic of the operation is as follows: (*a*) The lip is detached from the upper jaw. This detachment is necessary in the majority of the cases, especially when the nostril is displaced. A gauze tampon is placed at once upon the resulting raw surface; this diminishes the hemorrhage and prevents the drainage of blood into the buccal cavity. (*b*) Formation of two small flaps, consisting only of lip-red, by means of strong, straight scissors. During the formation of these flaps, the lip is stretched and moderately compressed with the index finger and thumb of the left hand. The small flaps are left entirely in site and are sufficiently substantial to guarantee their nutrition and survival. (*c*) Freshening of the

gap-margins under compression of the lip between the index finger and thumb of the left hand. The flaps must not be touched with instruments, for fear of damaging them. The wound margins should be as wide as possible. (*d*) The wound-margins are closed with fine interrupted silk sutures, all threads remaining untied for the time being. (*e*) All the sutures having been applied, the threads are tied, preferably from below upwards. In addition, one or two very fine threads, one passing only through the mucosa, may be utilized for the widest possible mutual adaptation of the flaps. (*f*) No dressings at all are used, the site of the suture remaining entirely uncovered.

In the treatment of bilateral hare-lip, the author recommends operating first on one side, and about six to eight weeks later on the other side, in the manner described above. His method of flap-formation differs essentially from all other procedures described in the ordinary textbooks.

Advance of Odontology. H. Allaeys. Revue Belge de Stomatologie, 1920, xviii, No. 5, p. 253.

A college of odontology, connected with the medical faculty, has just been founded in Montevideo, the capital of Uruguay. The obligatory studies in this school require four years, and the entrance examination is the same as for the medical students. It is encouraging to find this high standard upheld in new countries with a still relatively small scattered population, where the stomatologic ideal cannot for the present be realized. From the date of inauguration of the teaching of this new specialty, the entrance requirements and the program of serious studies are such as to prepare the ways in anticipation of the time when more favorable circumstances will permit the full and entire realization of the aims of odontology and orthodontia. As the author says: "The good work is still going on."

A Peculiar Case of Buccal Hemorrhage. W. Metzger. Zahntechnische Rundschau, 1920, xxix, No. 35, p. 401.

The patient was a woman 48 years of age, who came under observation with a history of frequently repeated bleeding from the gums, of about a week's duration. She was wearing two artificial dentures, and after these plates had been removed, local examination showed at first glance an upper jaw devoid of all teeth and roots. The hemorrhage was said to come exclusively from the upper jaw in the region of the lips. All stumps and decayed roots had been removed three years previously, before the application of the denture. On closer examination, the region of the former site of the canine or a small incisor tooth on the upper right side showed two minute punctiform depressions in the mucosa; the one situated towards the palate was found to be the exit orifice of the blood. The two small openings were connected by a bridge of mucous membrane 6-7 mm. in length. As the result of sounding, suspicion arose of a persistent canine root, at a not very considerable depth. The small mucous bridge was cut through, bayonet-shaped forceps were applied, and a hook-like curved root was extracted, without much difficulty. The presence of this root had caused neither an inflammatory process nor given rise to an abscess, but

had evidently led exclusively to this peculiar profuse intermittent hemorrhage. Prompt recovery followed without further treatment, the patient being simply instructed not to wear the upper denture for some days. At the time of extraction of all the other roots, in her upper jaw, three years ago, this right canine root had evidently been overlooked because it was broken off deeply and overgrown with gums. In the course of time, the jaw endeavored to expel this root, but was prevented by the pressure and fixation of the rubber plate, until the mucosa finally gave way at two small points and the curved tip of the root eroded a minute artery which gave rise to the hemorrhage. This unusual case shows how a decidedly bloody operation served to control a not inconsiderable loss of blood.

Ankylosis of the Mandible and Its Operative Treatment. G. Chubb. British Medical Journal, 1920, i, 256.

Five consecutive cases of ankylosis of the mandible came under the author's personal observation and operative treatment. The formation of fibrous or bony adhesions between the anterior border of the coronoid process and the pterygoid surface of the maxilla was found to be a factor in the articular fixation, in all of these cases, independently of the primary cause. The ankylosis was of traumatic origin in four of the five cases, the last being due to infection after a bilateral suppurative arthritis of the temporo-mandibular joints in infancy. The traumatic cases all concerned the molar region and were accompanied by fracture of the zygoma; the temporo-mandibular joint was not involved, and in three of the four cases the fracture of the zygoma directly involved the coronoid process in the resulting adhesions to the surrounding structures. Nevertheless in each case the formation of fibrous or bony adhesions between the lower part of the anterior border of the coronoid and the maxilla could be determined. In each case also, free movement of the mandible was not obtained until the coronoid process had been completely removed down to its base. The author's operation permits of the complete reaction of the whole of the coronoid. In one case this structure was removed on both sides, together with the condylar neck region of either side also. In no case was there any involvement of the facial nerve, and in each case the patient was left with a gape of at least 2½ cm. and a very satisfactory power of mastication. In each case the whole of the coronoid was removed, so that the anterior aspect of the condyle passed in a clean sweep down to the commencement of the alveolar border of the horizontal ramus. The incision for this operation starts in the preauricular fold at the lower level of the external auditory meatus, and passing vertically upwards to the level of the tip of the pinna, curves forward below the superior temporal crest to terminate anteriorly within the hair area of the temporal region. The incision is carried down to the bone, and the skin, temporal fascia and muscle are separately defined and turned forwards. The deeper of the two layers into which the temporal fascia splits as it approaches the zygoma is divided, and the latter bone, still working from the deep aspect of the temporal fascia, is removed piecemeal with gouge forceps. The tip of the coronoid is defined, and both its surfaces cleared of muscular attachments with the raspatory. By means of suitably shaped gouge forceps the whole of the coronoid process can now be

removed. During this process the surgeon is working between the temporal muscle and belly of the external pterygoid on the one hand, and the under surface of the masseter as this passes to its insertion into the outer face of the coronoid and angle on the other. Throughout the operation the surgeon stands at the head of the patient, and the approach to the pterygoid region is by way of the temporal fossa.

The Saliva in Diabetics. Rathery and Binet. La Presse Médicale, 1920, No. 27, p. 263.

Certain peculiarities have been noted in the saliva of diabetic patients, and these may be summarized as follows: The saliva in these cases is scanty, often viscid, not infrequently acid, and sometimes contains glucose in considerable proportions. The elimination of sugar through the glands has been experimentally demonstrated in animals (dogs) whose blood sugar contents had been raised either by intravenous injections of glucose or by the total removal of the pancreas. Clinically, glycosiahorrhea may accompany glycosuria, or alternate with it, or exist by itself alone, without the appearance of sugar in the urine.

Etiology of Ulcero-Membranous Stomatitis. J. Ferrier. La Revue de Stomatologie, 1920, xxii, No. 8, p. 452.

The author points out that in the etiology of this disease, attention must be directed, not so much to the microbic action as to the condition of the mouth itself. As a matter of fact, gingivitis or ulcero-membranous stomatitis have never been observed in a well-kept mouth, no matter how bad the general and nutritional condition; all that is necessary to control the symptoms is to establish perfect conditions of buccal cleanliness. The culture-media must be suppressed from which the microbic invasions constituting stomatitis and acute or chronic ulcero--membranous gingivitis take their origin. Without a culture-medium, there can be no fusospirillary symbiosis. The products of desquamation of the buccal mucosa accumulate more or less as a deposit in the dental interstices and other recesses, where together with the superadded alimentary débris, they form a culture-medium for a variegated microbic flora. Under ordinary conditions of life, the buccal equilibrium is sufficient for the maintenance of health, but in the presence of a general or local weakening of the buccal mucosa, a general weaking of the mucosa lining of the digestive passages, or of the general resistance, a state of general or local congestion, or any other cause of aggravation of microbic virulence, the infection will manifest itself. The starting point may be the covering of the wisdom-tooth or any other erupting tooth, or a dental interstice, or a tonsillar crypt, the infection becoming readily propagated to the vicinity through the uninterrupted chain formed by the interstitial deposits, connected by the intergingivodental grooves; and in certain localities, through contact in oculation. When the dental interstices are clean and empty, the local foci which may appear under a tonsillar crypt, for example, will remain restricted to their starting-point. The deposits are capable of serving as a culture-medium and are accordingly not the cause, but the condi-

tion of the disease. Removal of these deposits and application of antiseptics to all accessible points, from dental interstices to tonsillar crypts, including all recesses of the mouth, will result in prompt recovery.

Relations between Chlorosis and Dentistry. R. Holz. Zahntechnische Rundschau, 920, xxix, No. 37, p. 429.

The author's discussion of the subject is limited to the relations between chlorotic changes of the blood and dental surgery in the form of extraction of teeth, on the basis of menstrual disturbances in women and tests of the blood pressure fluctuations in chlorotic and menstruating individuals. He examined a large number of women and invariably found a slightly elevated blood pressure on the first day of menstruation; reaching the conclusion that the onset of menstruation undoubtedly imposes special caution as regards menstrual secondary hemorrhage after the extraction of teeth, on account of the rise of blood pressure and increased heart action. Care is indicated especially when the extraction is performed in the late afternoon hours, the occurrence of secondary hemorrhage being favored by the horizontal position of the body at night. No definite statements are as yet available concerning the blood pressure in chlorosis, some observers describing it as too low, others as normal, and still others as too high. The author's investigations of the blood pressure in chlorosis were conducted on about forty women, some of whom were disabled and bedridden as a result of the blood disease. The blood pressure values were determined at the time of the menstrual flow as well as during the interval. Slight elevations of blood pressure were noted in part on the first and in part also on the second day. In a general way it could be shown that at the time of menstruation, chlorotic women who otherwise present a normal, or even subnormal, arterial pressure, frequently have a demonstrably increased pressure, so that caution is indicated in the performance of extractions. In his recent experience, a severe secondary hemorrhage followed the extraction of a tooth in a highly chlorotic patient, requiring four days for its control by means of repeated infusion of physiologic salt solution, internal administration of gelatine, and local measures.

Treatment of Sublingual Cysts. F. Bonnet-Roy. Paris Médical, 1920, x, No. 36, p. 184.

The various treatments suggested for the cure of salivary cysts on the floor of the mouth are based on two different principles, namely radical treatment by extirpation of the tumor, or destruction of the cyst-wall by means of chemical agents. Neither is entirely satisfactory, complete extirpation, because it is very difficult or even impossible, and destruction by chemical agents because it is generally insufficient and exposes to recurrences, besides being rather painful. There exists a third method which to some extent partakes of each of the others; it consists in incision and marsupialization of the cyst-sac, followed by destruction of the exposed wall through the action of strong topical applications. This treatment was employed, with encouraging results, in several cases of sublingual cyst which came under observation in the Lariboisiere Hospital, in the course of the last few months. The technic is fairly simple:

An incision of the sublingual mucosa over the transparent protuberance of the cyst, following its long axis, from end to end, serves to expose the wall itself, without damaging it, provided this incision is shallow and very cautiously applied. This first step is not easy, on account of the extreme tension of the sac. The dissection of the cyst-wall is now carried as far as possible, being usually limited externally by the presence of the sublingual gland; it is easier within, where the grooved catheter readily discovers the lingual nerve, and less regularly, Wharton's duct. The upper third of the tumors having been liberated, the cyst is opened with a snip of the scissors, from its anterior to its posterior pole, as far as possible. The sticky fluid contents are allowed to escape, and the entire exposed portion of the wall is then resected, applying small Kocher's forceps over the cut surface. The cyst is now wide open, and presents an approximately hemispherical cavity which is freely accessible. In order to maintain the gap, it suffices to suture the parietal cut surface to the lips of the incised sublingual mucosa, with five or six silk or linen sutures. In the marsupialized sac, a careful cauterization is carried out, reaching the deeper folds, by means of a ten or five per cent solution of silver nitrate. The intervention is made under local anesthesia in tractable patients, or under general anesthesia. The outcome is successful only on condition that during the next following days, the cauterizations are repeated at the rate of three or four weekly, for about a fortnight. The difficulty consists in the extraordinary tendency of the marsupialized orifice to spontaneous rapid closure, so that the persistence of the orifice must be verified every day as long as the cauterizations are continued. In one instance, the author was obliged to leave a small wick in place during twenty-four hours. The cyst-sac promptly loses in depth and becomes reduced to a small blind fistular tract, which is soon obliterated. The patient should be examined at intervals during three or four weeks. At the end of the treatment, nothing is left but a more or less indurated cicatrix which slightly binds the sublingual mucosa and gradually disappears. This procedure must be thoroughly carried out so as to guard against recurrence. A case of partial recurrence recently came under the author's observation, the recurrence being actually limited to the anterior culdesac of a cyst which had been incompletely cauterized one month previously; the primary cavity had become transformed into a fibrous cicatrix. The same treatment was repeated and a cure obtained. Marsupialization and cauterization of the sac, in the author's opinion, constitute the treatment of choice for sublingual cysts.

Epilepsy from Undescended Teeth. Editorial. The Journal-Lancet, 1920, xl, No. 19, p. 550.

A careful examination must be made of everything that might possibly act as an epileptic factor, and it goes without saying that the teeth are entitled to a maximum of attention in this respect. The writer is acquainted with the case of a boy, now about ten years of age, who as a young child suffered from apparently typical epilepsy and was regarded as incurable. After he had shed his primary teeth, and his permanent teeth had developed in proper order, the epileptiform attacks subsided and his mental condition greatly improved. Another child, with diseased primary teeth, suffered from convulsive attacks and

was looked upon as an epileptic, but all attacks ceased as soon as the temporary teeth were eliminated from the mouth and the true teeth had appeared in their normal position. These two cases are eloquent illustrations of the necessity of always remembering the dental point of view in pediatric practice. Undeveloped and undescended teeth are probably often responsible for apparently organic nervous disease or functional nervous disturbances. On x-ray examination, molars are not infrequently found lying horizontally in the jaw, unable to descend, but capable of creating considerable disturbance by pressing on the molars in their immediate vicinity. The removal of from one to four molars of this type means a capital operation, which can be performed only by an expert, a skilled surgeon-dentist. Undoubtedly, more attention than heretofore should be paid to undescended teeth, in view of their possible highly pernicious influence upon the delicate nervous system of growing children.

Respiratory Function and Occlusion. L. Subirana. La Journal Dentaire Belge, 1920, xii, No. 3, p. 122. (Madrid Odontological College.)

Orthodontic cooperation is indispensable in a very high percentage of surgical procedures for the establishment of physiologic respiration. The author emphasizes the close relation between rhinology and orthodontia, pointing out that normal dental occlusion is formed in only 8 to 9 per cent of all cases and that this perversion interferes with nasal breathing. Malocclusion not only alters the facial outlines and hinders mastication, but it disturbs the relations and modifies the configuration of the bones and muscles of the mouth. The cause of malocclusion dates back to antenatal conditions; when the embryo and fetus fail to develop physiologically, the mutual developmental influence is arrested, which normally exists between the organs of the face and the head, affecting size, shape, and function. Regarding the mouth and the teeth, embryonic conditions indicate the physical influence exerted by the lips, cheeks, and tongue in the establishment of occlusion. The temporary denture, and the permanent denture in later childhood, are factors of great etiologic importance in the development of the jaws and in the production of faulty occlusion. Organic and functional coordination is highly significant in the mouth, on account of the important functions discharged by the mouth and the organs directly related to it. The teeth are held in equilibrium by a system of natural forces; when one of these forces is missing the teeth become displaced, and one of the more immediate results is mouth-breathing. This statement is confirmed by the author's clinical observations, and by his personal experience upon himself, with abnormal dental occlusion. Although any form of nasal obstruction may be the cause of malocclusion of the teeth, the latter may in certain cases constitute the only etiologic factor of mouth-breathing. Surgical rhinologic interference is apt to prove inefficient in numerous cases, unless it is accompanied by dental correction.

The International Journal of Orthodontia and Oral Surgery

PUBLISHED THE FIFTEENTH OF EVERY MONTH BY

THE C. V. MOSBY CO., 801-809 Metropolitan Bldg., St. Louis, Mo.

Foreign Depots—*Great Britain*—Henry Kimpton, 263 High Holborn, London, W. C.; *Australasia*—Stirling & Co., 317 Collins Street, Modern Chambers, Melbourne; *India*—"Practical Medicine," Egerton Street, Delhi; *Porto Rico*—Pedro C. Timothee, Rafael Cordero 68, San Juan, P. R.

Subscription Rates—Single copies, 50 cents. To anywhere in United States, Cuba, Porto Rico, Canal Zone, Mexico, Hawaii and Philippine Islands, $5.00 per year in advance. Under foreign postage, $5.40. Volume begins with January and ends with December of each year.

Remittances—Remittances for subscriptions should be made by check, draft, postoffice or express money order, or registered letter payable to the publishers, The C. V. Mosby Company.

Contributions—The editor will be pleased to consider the publication of original communications of merit on orthodontic and allied subjects, which must be contributed solely to this journal.

Opinions—Neither the editor nor the publisher hold themselves responsible for the opinions of contributors, nor are they responsible for other than editorial statements.

Reprints—Since it is not desirable to hold type standing longer than absolutely necessary, all requests for reprints should be made at time of submitting manuscript for publication. Rate card will be sent with galley proof.

Communications—Contributed articles, illustrations, letters, books for review, and all other matter pertaining to the editorial department should be addressed to the Editor, Doctor Martin Dewey, 501 Fifth Ave., New York City. All communications in regard to advertising, subscriptions, change of address, etc., should be addressed to the publishers, The C. V. Mosby Company, 801-809 Metropolitan Building, St. Louis, Mo.

Illustrations—Such halftones and zinc etchings as in the judgment of the editor are necessary to illustrate articles will be furnished when photographs or drawings are supplied by the authors of said articles.

Advertisements—Objectionable advertisements will not be accepted for publication in this journal. Forms close first of month preceding date of issue. Advertising rates and sizes on application.

Change of Address—The publishers should be advised of change of subscriber's address about fifteen days before date of issue with both new and old addresses given.

Nonreceipt of Copies—Complaints for nonreceipt of copies or requests for extra numbers must be received on or before the fifteenth of the month of publication; otherwise the supply is apt to be exhausted.

Entered at the Post Office at St. Louis, Mo., as Second-Class Matter.

EDITORIALS

A Practical Treatise on Artificial Crown-, Bridge-, and Porcelain-Work*

EVANS' "A Practical Treatise on Artificial Crown-, Bridge-, and Porcelain-Work" was introduced to us in our student days, and we are pleased to welcome the eighth edition. The completeness of the eighth edition surpasses all of our expectations. It almost seems incredible that such a complete treatise on crown and bridge work could be contained in a book the size of the present edition. Dr. Evans has succeeded in getting all the necessary information on the various systems in use today into a book that is well suited to the needs of the student, as well as the general practitioner.

The book is divided into seven parts. Chapter 1 includes a description of the various instruments and materials used in crown and bridge work. This

*A Practical Treatise on Artificial Crown, Bridge and Porcelain Work. By George Evans, D.D.S., F.A.A.D.S., New York. P. Blakiston's Son & Co., Philadelphia. Eighth edition, revised and enlarged. With 567 pages, and 1143 illustrations. Price $7.50.

is particularly valuable to the student. Chapter II deals with the various metals employed in this work, but refers the student to his work in metallurgy for a detailed description of them. Various impression materials and compounds are considered, including the newer so-called artificial stones. Chapter VII deals with the casting process and gives a description of the various modern casting methods and machines, and calls attention to the advantages of each as found by the author.

In Part II the author discusses the treatment of teeth and roots for the reception of crown and bridge work. This part may be criticized more than any other, owing to the various opinions regarding the proper treatment of pulpless teeth. Poor technic in the treatment of roots of teeth has subjected crown and bridge work to severe criticism. If the tooth is treated according to surgical principles, the method used is not so important. Very often crowns and bridges are placed on roots that are not ready to receive them, and the result is very unpleasant.

Part III is given over to the consideration of artificial crowns. The various types and kinds of crowns are described. This makes the chapter especially valuable to students who should be familiar with the different styles of crown about which State Boards are in the habit of asking. The average dentist will make only a few of these various types of crowns, but should he ever wish to learn anything of the different methods of making restorations this chapter is valuable. One of the important factors in the construction of crowns and in their usefulness is the occlusion, and Dr. Evans calls particular attention to this subject.

Part IV deals with bridge work, its history, and the mechanical principles involved. The various types of bridges are considered, as well as some of the difficulties encountered in their construction and repair. Part V takes up removable bridge work. It is very complete, giving the important features in the construction of the different types as described by modern writers.

The porcelain art is discussed in Part VI. Porcelain bodies are described as well as furnaces and methods of fusing porcelain. Porcelain inlays are considered in this chapter. While they do not come under the classification of crown and bridge work, we see no objection to placing them in this text. The subject is well treated. Part VII is given over to the consideration of crown, bridge, and porcelain work combined with operative dentistry in dental prosthesis. This shows the close relation existing between these various subjects.

To the student we recommend this book as being the best for his needs. It should also be read by the general practitioner who desires to do the best for his patient by employing the method or type of work best suited for the particular case.

Dental Hygienist

THE United States Civil Service Commission announces an open competitive examination for dental hygienist. Vacancies in the Public Health Service throughout the United States at $720 a year, plus quarters, subsistence, and laundry, or compensation therefor, usually at $62.50 a month, and vacancies

in positions requiring similar qualifications, at this or higher or lower salaries, will be filled from this examination, unless it is found in the interest of the service to fill any vacancy by reinstatement, transfer, or promotion.

Bonus.—Appointees whose services are satisfactory may be allowed the increase granted by Congress of $20 a month.

Citizenship and Sex.—All citizens of the United States who meet the requirements, both men and women, may enter this examination; appointing officers, however, have the legal right to specify the sex desired in requesting certification of eligibles.

Subjects and Weights.—Competitors will not be required to report for examination at any place, but will be rated on the following subjects, which will have the relative weights indicated:

Subjects	*Weights*
1. Physical ability	25
2. Education and experience	75
Total	100

Basis of Ratings.—Under the second subject competitors will be rated upon the sworn statements in their applications and upon corroborative evidence.

Registers and Requirements.—Two registers of eligibles will be established from this examination, as follows:

(A) Those who have completed the eighth grade of common school and are graduates from an approved school of dental hygiene or from a recognized dental college.

(B) Those who are not graduates, but have had private training in a dental office for a period equal to that in a school of dental hygiene; or who have been accepted for registration by a State recognizing dental or oral hygienists. Register (B) will be used for appointment when eligibles from Register (A) are not available.

Age.—Applicants must not have reached their seventieth birthday on the date of the examination. At the request of an appointing officer certification will be made of eligibles who are within reasonable age limits.

Retirement.—Classified employees who have reached the retirement age and have served fifteen years are entitled to retirement with an annuity. The retirement age for railway mail clerks is 62 years, for mechanics and post-office clerks and carriers 65 years, and for others 70 years. A deduction of 2½ per cent is made from the monthly salary to provide for this annuity, which will be returned to persons leaving the service before retirement with 4 per cent interest compounded annually.

Photographs.—Applicants must submit with their applications their unmounted photographs, taken within two years, with their names written thereon. Proofs or group photographs will not be accepted. Photographs will not be returned to applicants.

Medical Certificate.—The medical certificate in the application form should be executed by a medical officer of the Public Health Service where practicable.

Applications.—Applicants should at once apply for Form 1312, stating the title of the examination desired, to the Civil Service Commission, Washington,

D. C.; the Secretary of the United States Civil Service Board, Customhouse, Boston, Mass., New York, N. Y., New Orleans, La., Honolulu, Hawaii; Post Office, Philadelphia, Pa., Atlanta, Ga., Cincinnati, Ohio, Chicago, Ill., St. Paul, Minn., Seattle, Wash., San Francisco, Calif.; Old Customhouse, St. Louis, Mo.; Administration Building, Balboa Heights, Canal Zone; or to the Chairman of the Porto Rican Civil Service Commission, San Juan, P. R.

Applications should be properly executed, *including the medical certificate,* but excluding the county officer's certificate, and must be filed with the Civil Service Commission, Washington, D. C., prior to the hour of closing business on March 1, 1921.

The exact title of the examination, as given at the head of this announcement, should be stated in the application form.

Preference.—Applicants entitled to preference should *attach to their applications* their original discharge, or a photostat or certified copy thereof, or their official record of service, which will be returned after inspection by the Commission.

ORTHODONTIC NEWS AND NOTES

The editors desire to make this department a permanent feature of the Journal, but in order to do so must have the full support of the orthodontic profession throughout the country. We would deem it a great favor if our subscribers and readers would send in such announcements as might be of interest to the profession.

Missouri State Dental Association

The next meeting of the Missouri State Dental Association will be held in Springfield, Missouri, April 25, 26, and 27, 1921. It will be featured by a short, intensive, postgraduate course.

J. F. Wallace, President,
Carlyle Pollock, Secretary.

The American Society of Orthodontists

The American Society of Orthodontists will hold its twentieth annual meeting at the Hotel Ambassador, in Atlantic City, April 27, 28, 29, and 30, 1921. A cordial invitation to attend this meeting is extended to all interested in orthodontia.

Ralph Waldron, Sec.-Treas.

Williams School of Orthodontia

The next annual summer session of the Williams School of Orthodontia will be held at Glenwood Hotel on Cayuga Lake, Ithica, New York, commencing Monday, August 1, 1921. Prospectus on request. Address: O. T. Rule,D.D.S., Sec'y, 1 Bank Street, Stamford, Conn., or Percy Norman Williams, D.D.S., 40 East 41st Street, New York City.

News Notes of Interest

Major Jos. D. Eby, after completing the maxillo-facial work at Walter Reed General Hospital, filing and indexing all the records, and preparing a museum of the same, requested a discharge as a temporary officer. He is now associated with Dr. Victor Hugo Jackson in the practice of Orthodontia and Oral Surgery, 40 East Forty-first Street, New York, N. Y.